THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER, AND ELECTRO-PLATERS REVIEW.

A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

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CONTENTS.

BRASS SECTION OF THE AMERICAN FOUNDRYMEN'S ASSOCIATION.

The American Foundrymen's Association will hold its next annual meeting in New York City from June the sixth to the ninth, headquarters having been established at the Murray Hill Hotel. It is only justly due to the association to say that it counts among its members the most progressive and leading men in the foundry business in this country and that it has done a great deal of work to bring about a better understanding of modern methods of working and tendencies of progress in the foundry. Special credit has to be given to the work of its efficient secretary, Dr. Richard Moldenke, who has labored hard in this direction.

It is with sincere gratification that THE METAL INDUSTRY hears of the endeavor on the part of the American Foundrymen's Association to establish a brass section. The value of a thorough discussion of the various important questions which are constantly presenting themselves in the production of various alloys, especially of those which by reason of the introduction of small amounts of various metals differ from those made by the old-fashioned methods, is self-evident. It has been pointed out at various times that there is no scarcity of problems to be discussed. The need of such an association on the part of the brass foundrymen has been in evidence for some time past, and there is no doubt that a section like the proposed one would go a great ways towards bringing them together. In this way opportunity would be presented to the individual members for an interchange of opinion for the benefit to themselves and to the trade in general. It is a well established fact that the value of conventions rests not so much in the papers which are read and presented at those meetings, as there is seldom an opportunity to dicuss them exhaustively in all their bearings. The greatest benefit to be derived from them is the bringing together of people interested in the subject and the private interchange of opinions among themselves. A further valuable feature consists in the bringing up of various questions which may have been encountered by the members in their practice and thus bringing matters to the attention of the other members, which may have previously escaped them, or which they may have overlooked when they encountered similar occurrences in their own factories.

THE METAL INDUSTRY welcomes the American Foun-

drymen's Association to New York City and sincerely hopes that the formation of the brass section of the association will become an established fact.

FOUNDRY COST KEEPING.

Modern methods of cost keeping are a good deal more complicated and go much more into systematic details than those that were in vogue in former years. It, however, must be doubted if the foundry is a proper place for such elaborate methods. No doubt they are extremely well adapted and are probably requisite in places such as machine shops with their highly diversified and intricate kind of work, but they would be somewhat out of place in the foundry and might easily degenerate into what is sometimes called contemptuously by the workmen "red tape." There is on the other hand no excuse for running a foundry by rule of thumb as is not infrequently done yet, especially in smaller establishments. The labor and material costs, which go to make up the price of castings, are in most cases well established items and should not vary much in places where products of a similar character are turned out. A great difference may, however, occur in incidental expenses, losses due to imperfect castings and a variety of small expenses which in the aggregate amount to a very considerable sum of money at the end of each month. Every foundry foreman should be in a position to know the exact cost of the castings he turns out, including indirect expenses. It would, of course, not do to have each workman and laborer walk around the place with a pencil behind his ear and filling out slips, as this takes up his time and takes him away from his work, but the foreman should adopt a common sense method by which he can arrive at these costs without an undue amount of labor and waste of time. He should know exactly at what outside price his castings should be delivered into the stock room in order to enable them to be sold at a profit. In that case no blame can be put upon him, if the prices obtained for the castings do not prove as remunerative as they should, for if the establishment maintains an expensive administrative and selling department, the cost for the latter may easily amount to so much as to counterbalance the profit which is made in the manufacturing branch of the concern.

A THIRD GROWTH.

We are pleased to announce that with this issue THE METAL INDUSTRY has been enlarged four pages, for the third time this year, making an increase of 12 pages in advertising and reading matter since December, 1904. The number of subscribers has likewise increased in even greater proportion, each month showing a substantial gain over last year's figures. Our advertisers also report that they are receiving increased returns from their advertisements. We are much gratified at this showing and take this opportunity of thanking our readers for the appreciative letters which have been received from all over the world. As in the past, we will in the future spare no expense or effort to make THE METAL INDUSTRY more interesting and instructive to its readers and more valuable to its advertisers.

HONESTY IN THE OLD METAL TRADE.

It is difficult to realize what a large amount of old metals annually happens to find its way back into consumption. It should be quite a profitable business, but as it stands now, there is a good deal of complaint, especially among the larger dealers, that the smaller ones offer even a higher price for old metals than they themselves can afford to pay, notwithstanding the fact that not a few of the larger dealers are consumers themselves. This seemingly unexplainable fact is readily understood when the fraudulent practices, to which many dealers have recourse, are taken into consideration. One instance was recently called to our notice where a dealer bought and paid for 1,800 pounds of old metal. These he loaded in two carts, one of which was followed up to the works of the party to which he sold it. When the cart was weighed again at that place it was found to weigh 3,000 pounds. How much metal was in the other cart was not ascertained, as it was not delivered. The accuracy of the scales used by the junk dealers is a standard subject of jokes, as is shown by a recent tale in the New York *Sun*, where it was related that a new born baby was weighed on a junk dealer's scales and was found to weigh 7 pounds, to the utter astonishment of the father and the nurse. The junk dealer was reported to have said, "Don't let that worry you. These are the scales I buy by. I guess the child weighs 10 pounds, maybe a little over that." This may be a joke, but it might nevertheless easily be true. It is just such practices as that which bring the old metal trade into disrepute, to the detriment of the honest traders in the business. It is high time that such practices be stopped and that a higher standard of business should be adopted.

COPPER MELTING IN THE CUPOLA.

Occasionally for heavy castings it is necessary to melt the copper in the cupola instead of in the ordinary crucible. In doing this it is necessary to employ a good deal of precaution in order to get along with as little loss as possible, inasmuch as the operation is a very delicate one. It has been found that it is not desirable to use quite as heavy a pressure on the blast as when melting iron. The necessary blast pressure to be used is largely a matter of experience. Coke is used as fuel and the same bed is usually employed as would be used for iron. The cupola is filled up or the bed is made about to the hole from which the metal runs and it is drawn off as it melts. If it was all kept in the cupola until the entire mass had become liquid it would be liable to oxidize or a good deal of the copper would be burned off. It is, therefore, drawn as stated above and it has been found necessary to weigh the melted metal rather than to charge the cupola with a certain amount of metal which is absolutely required for a mixture. The reason for this is that it is impossible to get the metal all melted and out so that it can be poured with the zinc and tin added in the right proportion. Of course, the zinc and tin are put into the metal after it is drawn from the cupola.

THE MOLDING MACHINE IN THE BRASS FOUNDRY—VARIOUS TYPES.

By F. W. Brown.

The day has come when a brass foundry of any size can no longer do without a molding machine. There are several reasons why the brass foundryman needs a machine, namely, first, for getting his work out on time; second, for turning out his castings more uniformly than can be done by hand molding; third, it enables him to compete with his neighbor on price, quality or time. Again many foundrymen are saved a strike, as the trouble makers realize that the firm can do without them if pushed to it, by putting green laboring men on the machines. The machines have a tendency to unite the men and the boss, and if the boss is a fair-minded man, all can be arranged satisfactorily to both parties and any sensible boss will try to avoid trouble and keep his men contented.

There are many large brass foundries in the country that have increased their output 100 per cent. in quantity and 30 per cent. in quality by the use of machines. These latter are generally of the power type, and to these firms the molding machines are indispensable. There are some foundrymen who have made a failure of machines, but as a general rule the blame has been found to rest with the foundryman and not with the machine. The management of the foundry should give their personal attention to the machine until it works right.

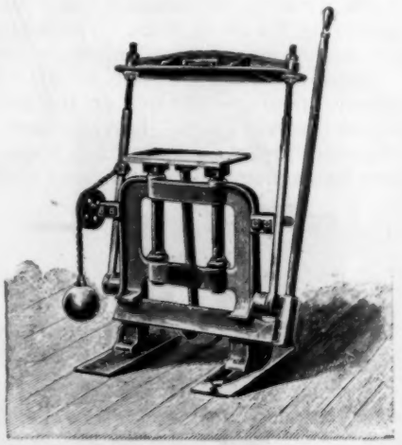


FIG. 1.—THE FIRST REYNOLDS MACHINE.

Molding machines were first used as early as 1800 on special work in England, but the first inventor and original manufacturer of them in America was H. Reynolds, of New Haven, Conn., who for years was the president of the Reynolds Company of the same place. Mr. Reynolds first introduced to the manufacturers of metal castings a molding machine in 1877, a cut of which machine is shown in Fig. 1. He met with much opposition from the molders. The Reynolds machine was of the hand-squeezer type and a very good machine in its day. Mr. Reynolds subsequently added many new features to it, some of which may be seen in Fig. 2, which illustrates one of the modern types. The molding machine business from 1877 was principally in the hands of the Reynolds Company for years, but about 1890 other machines came out, till now there are granted over four hundred patents in the United States. Yet out of that vast number only a few were ever put on the market, some of which I will briefly describe in the following:

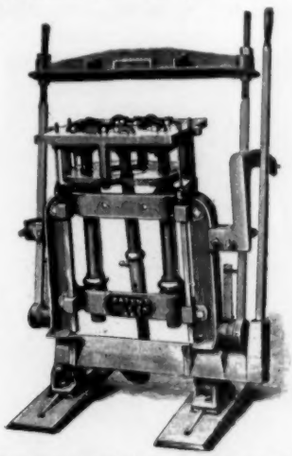


FIG. 2.—THE IMPROVED REYNOLDS MACHINE.

FIG. 3.—THE FARWELL.

The Farwell molding machine and press was first used by the Adams Company, of Dubuque, Iowa, and in 1896 it was first introduced by the T. E. Adams Company. Since then they have brought out the Farwell molding press, the Farwell universal machine, the Farwell automatic molding machine and the Farwell stool plate machine. Fig. 3 shows a Farwell Universal machine, 30 inches, stationary, used as a flask lifter. This is a very

accurate machine and is used in many brass foundries in the United States. The flask lifter is a new feature, and it is a good one. The patterns are mounted on a match plate in a similar way as on the Reynolds machine; the ratio of leverage is 30 to 1. This machine is a simple, strong and durable quick-working machine and molds as large as 18 by 22 in. can be presed with ease.

Fig. 4 shows the Turner machine, made under the McCanna patent. This machine is manufactured by the Turner Machine Company, of Philadelphia, and is an entirely hand-operated machine, requiring a very small

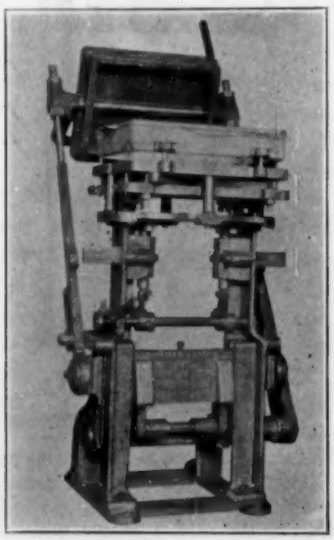


FIG. 4.—THE TURNER.

outlay for pattern plates. This machine has one important feature, viz., a patented pattern rapper and flask lifting device, which does away with the expensive draw plate. Another good feature is the automatic reversible rammer and tucker, which is operated by a pull of the lever. Fig. 4 shows the machine with the spider slipped from its supports and the flask raised by the lever movement. In the figure the pene side of the rammer is shown thrown over for peneing or tucking. In molding with the McCanna machine all that is required is a base plate, on which halves of the patterns are grouped in a manner calculated to get the best advantages from the

FIG. 5.—THE STEARNS.

area presented in the plate. The plates are 2½ x 15 in. and 13 x 16 in. sizes, which have been found to give the best results on all class of work. The method of gating is similar to that employed with plated patterns in general.

In Fig. 5 is seen another type of a squeezer machine, called the Stearns machine, manufactured by E. C. Stearns & Co., of Syracuse, N. Y. This machine is somewhat like the Farwell machine and is used in both iron and brass foundries, where squeezing is only desirable. The machine is so designed that the plate when thrown back forms a regular bench that a molder can work on by hand. It is made in two sizes.

Fig. 6 shows a Paxson-Hall machine, manufactured by the J. W. Paxson Company, of Philadelphia, Pa. This machine is designed to be worked either by hand or air power, using compressed air at 75 to 80 pounds pressure.

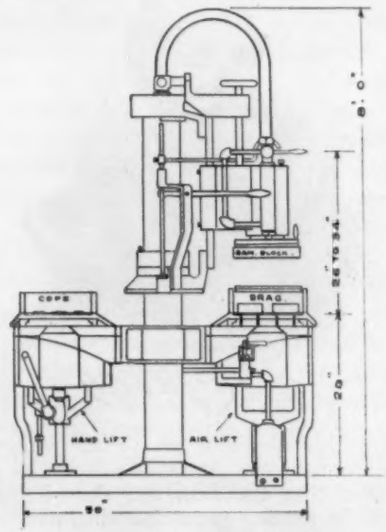


FIG. 6.—THE PAXSON-HALL.

It is adapted to all classes of work (stripping plate or match plate jobs) from the simplest to the most difficult. Among its points of advantage is the downward ramming device, and the doubling-up feature of the tables, as many as four of which can be used around one column, the one rammer answering for all of them. The stripping of the flask pins is another good feature only to be found on this machine. These machines are built in all sizes and are the only down-ramming machines on the market. The ramming head revolves on ball bearings and when it is is in true line with the flask on the table, a special locking device comes into action, holding the head firmly in place

FIG. 7.—THE PIEDMORE.

during the ramming. The movement of the ramming head one-eighth of an inch out of line with the flask causes the safety device, which locks the throttle valve, to come into play, preventing the air from passing through

it into the ramming cylinder and thereby preventing accidents to the machine or the operator. The ramming cylinder is adjustable up or down to suit the flask being used.

In Fig. 7 is shown a Pridmore molding machine, manufactured by the well-known firm of Henry E. Pridmore, of Chicago, Ill. This type of machine is what they call a drop-pattern machine, because the patterns in leaving the mold drop down through a stripping plate. With this machine this is done by the aid of a crank at one side of the machine. This is one of the most accurate methods of molding known to-day, and is used in many brass foundries throughout the country. Valves and journal bearings are typical jobs for it. This machine, like all their machines, is hand-operated throughout.

Fig. 8 shows a Tabor molding machine, manufactured by the Tabor Manufacturing Company, of Philadelphia, Pa. These machines are the leading up-ram power machines on the market to-day and are built in two different

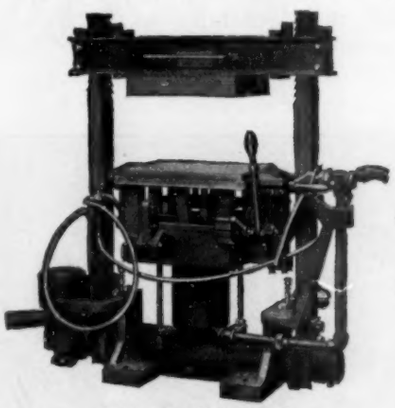


FIG. 8.—THE TABOR.

types, namely the vibrator frame machine and the split-pattern machine. They are built in various sizes and are

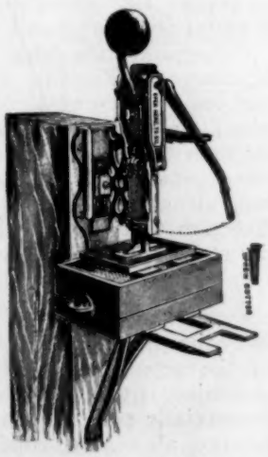


FIG. 9.—THE ECONOMIC.

operated by compressed air at 75 to 80 pounds pressure. The leading feature of this machine is the vibrator frame, where the patterns on a gate are attached to the frame by means of screws and the whole affair is rapped when in the mold by a pneumatic vibrator on one side of the frame. This is a practical brass foundry machine.

Fig. 9 shows the Economic molding machine, which is the smallest and lightest machine on the market and is manufactured by the Syracuse Malleable Iron Works, of Syracuse, N. Y. This machine is designed for small gated or carded work, that would go in a flask 11 in. x 13 in. up to and including 11 in. x 21 in., and also a 14 in. x 14 in. square. It is used in brass and malleable iron foundries. This machine can be bolted to a 8 in. x 10 in. post, or it can be bought mounted on a movable table, which can be pushed alongside of the sand pile. Fig. 9 shows the machine mounted on a wood post and squeezing a mold. The points of advantage are that the working parts are all encased, so that no dust or dirt can get to them to cut them out, and that, being above the mold, they cannot be buried with sand. The power is a geared eccentric in direct connection with a toggle joint, working a plunger direct over the top of the mold. It has on its side an adjustable gauge, which when set for the article desired enables each mold to be pressed uniformly when the molder pulls the lever up to the end of the gauge.

FIG. 10.—THE MODERN.

In Fig. 10 is shown the Modern molding machine, manufactured by the Arcade Manufacturing Company, of Freeport, Ill. It is a type of machine in which the sand is squeezed or pressed into the flask and can be used only with a match plate. The match plates are made in pairs, one plate to form the upper part of the mold and the other one the lower part. The match plates are fastened securely side by side on the revolving table. After the sand is put into the flask the bottom boards are secured in position by clamps. Then the revolving table is turned over, when the mold is resting on the sliding platform, and the sand is then pressed by pulling the long lever forward. The clamps are automatically released from the bottom board and the pattern is drawn by reversing the lever. This is a good machine where there are many duplicate molds to be made.

In the addition of non-metallic elements, such as prosphorus, to alloys, much grater care has to be taken than in the addition of metals, as the former act much more rapidly than the latter. Sometimes even the presence of only traces of metalloids will alter the properties of a metal.

Of the total consumption of copper in Germany in 1903, which amounted to 117,000 metric tons, 46,000 tons were consumed by the electrical works, 18,000 tons by copper rolling mills (rods and sheets), 32,500 tons by brass rolling mills and wire works, 2,000 tons for chemical work and blue vitriol and 18,500 tons in shipyards, railroads, for castings, alloys, German silver, etc.

VARIATIONS IN THE PROPERTIES OF ALLOYS.

By Percy Longmuir.

(Continued from May Number.)

III.

Whilst the influence of varying casting temperature on the mechanical properties of alloys is forcibly shown in the tests given, the reason for this variation is not so apparent. Not unnaturely one expects castings from the same crucible, poured into similar moulds within the range of fluidity to yield similar properties. This expectation is, however, not realized, and if proof is wanted an experiment on the lines indicated will readily settle the matter.

This is hardly the time to enter into a discussion of the constitution of alloys, but for our present purpose we may regard all alloys as crystallized. Evidently, then, the properties of an alloy are determined by the force binding these crystals together. It is reasonable to suppose that the general character of any crystals on separating, whether from a saline solution or a gradually solidifying alloy, is influenced by the particular environment, in the case of alloys especially by hydrostatic pressure and initial temperature. This question can only be studied by the aid of the microscope and unfortunately this instrument gives only indirect evidence as to the cohesive force binding individual crystals together. Collectively this binding force is well shown in the tenacities given, and these must be taken as some index of individual cohesion.

However, the microscope does offer a flood of direct evidence as to the general character of the crystallization and the structural changes due to varying casting temperature. Thus Figs. 5, 6 and 7 reproduce the structure of three gun metal castings poured from one crucible at suitable time intervals all within the range of fluidity. They are, like the mechanical properties, essentially distinct from one another although all precisely the same chemically. Long-continued observation has led to the following conclusions in which for convenience three typical casting temperatures, "high," "fair" and "low," are taken. "High" casting temperatures, Fig. 5, favor a large, ill-developed type of crystallization, giving a characteristically "loose" type of structure. Fair casting heats, Fig. 6, favor a distinct but yet interlocked structure, and the crystal junctions are not so marked as is the case with the lower temperatures. Low casting temperatures, Fig. 7, give a most pronounced type of crystallization and the crystal junctions are very sharply defined, apparently forming routes along which fracture readily travels. Summarizing these conclusions it will be seen that

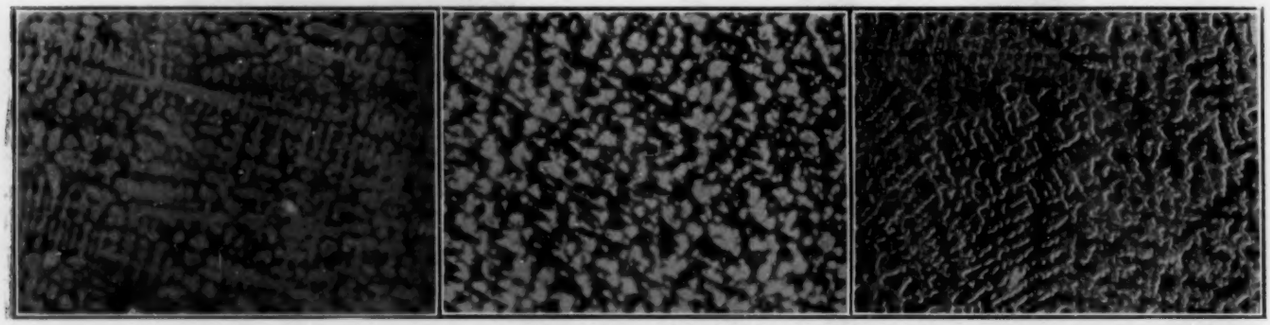
"High" casting temperatures give a loose structure.

"Fair" casting temperatures give an interlocked structure.

"Low" casting temperatures give a sharp structure.

The behavior of castings possessing these types of structure under steam or water test is as follows: Loose structures allow steam or water under pressure to ooze through the minute interstices of adjacent crystals. Interlocked structure effectually prevents any percolation of this kind, and the castings are therefore tight within all pressures up to their limit of deformation. Sharp structures familiar to castings poured at a low heat will, if the crystal junctions favor, and they generally do, offer microscopical routes of penetration similar to those of high temperature castings.

FIG. 5. FIG. 6. FIG. 7.



Structure of Gun Metal poured at the "High" Temperature, magnified 58 diameters.

Structure of Gun Metal poured at the "Fair" Temperature, magnified 58 diameters.

Structure of Gun Metal poured at the "Low" Temperature, magnified 58 diameters.

Turning to a copper zinc alloy, three typical structures of Muntz metal are reproduced in Figs. 8, 9 and 10. In these photographs the black crystals represent a high zinc compound Zn_2 Cu, (2 zinc, 1 copper), whilst the white ones represent a compound Cu_2 Zn (2 copper, 1 zinc). The crystallization of Fig. 8 is relatively larger than that of the two following ones, one large black crystal being specially noteworthy. The "interlocked" structure of Fig. 9 is shown in the difference of direction taken by the long white crystals. The sharp structure of the low casting heat is well shown in its pronounced crystallization.

IV.

Having shown the influence of varying casting temperature on the properties of alloys it may be well to briefly examine, if this influence holds good in the case of commercially pure metals. For this purpose the metals zinc, aluminum, copper and lead are selected. Results obtained from the first three are embodied in the following table:

Metal	No.	Casting Temperature °C	Max. Stress Tons per sq. in.	Elongation % on 2"	Remarks
Zinc	118	580	1.30	——	Poured at intervals from one crucible
	119	528	1.81	——	
	120	497	1.37	——	
Aluminium	121	725	4.48	2.5	do
	122	691	5.62	8.5	
	123	662	5.12	5.0	
Copper	124	1500	7.00	8.5	do
	125	1446	7.80	11.5	
	126	1141	8.80	8.0	

It will be noted that with a fragile metal like zinc a fall in casting temperature of only 37° C. is accompanied by a decrease in maximum stress of 986 lbs. per square inch. (See numbers 119 and 120.) In the other cases the differences are chiefly marked in the elongations.

Lead is characteristic in that, unlike zinc, it can be highly superheated. A crucible so heated and bars cast representing a very high casting temperature, when tested in the tensile testing machine, yielded an elongation of 8½% on 2 inches. Bars poured from the same crucibles after standing four minutes gave elongations of 35%. With lead the fair casting heat appears to be near the solidification point, and it is extremely difficult to obtain perfect castings typical of a low temperature, a feature explained by the absence of fluidity near the freezing point. The following results represent normal temperature variations and not exceptional ones, like the one just quoted, for commercial lead, each three results representing three temperatures from one crucible:

No.	Casting Temperature °C	Max. Stress Tons per sq. in.	Elongation % on 2"	Remarks
124A	1500	4.52	8.0	Nos. 124, 125 and 126 heated to 646 °C and cooled in air.
125A	1446	6.86	10.0	
126A	1141	8.51	8.0	
124Q	1500	5.80	9.0	Nos. 124 125 and 126 quenched in water from temperature of 543 °C.
125Q	1446	8.36	15.5	
126Q	1141	9.04	10.0	

FIG. 8. FIG. 9. FIG. 10.

Muntz Metal poured at the "High" Temperature, magnified 360 diameters.

Muntz Metal poured at the "Fair" Temperature, magnified 360 diameters.

Muntz Metal poured at the "Low" Temperature, magnified 360 diameters.

No.	Casting Temperature °C	Max Stress Tons per sq. in.	Elongation % on 2"	Remarks
127	506	1.70	40.0	Tested some time after casting.
128	426	1.71	40.0	
129	356	1.64	35.0	
130	580	1.13	18 0	Tested the day following casting.
131	430	1.43	35.0	
132	360	1.30	42 0	
133	580	1.44	30.0	Companion Bars of 130, 131 and 132 tested 3 months after casting.
144	430	1.46	37.5	
135	360	1.46	46.5	
136	575	1.41	20.0	Tested 6 days after casting.
137	450	1.47	35.0	
138	370	1.51	50.0	

The first set of bars are, in spite of differences in casting temperature, practically equal in mechanical properties. These particular bars were poured some considerable time before testing, and in the interval were stored in a room at an unknown temperature but one above atmospheric. These results, therefore, point to a recrystallization taking place at comparatively low temperatures, which is such as to entirely eliminate the influence of varying casting temperature. Nos. 133, 134 and 135, which are respectively companion bars of 130, 131 and 132, illustrate this feature, but here the interval of three months has not been sufficient to entirely eliminate the variations due to the varying casting temperature.

This feature is introduced because it represents the only case, in which the writer has obtained a neutralization of the influence of varying casting temperature. Various forms of after treatment applied to practically every commercial alloy and metal have not, except in the one case of lead, brought the properties to one level. With this exception, companion bars poured from one crucible at different heats, no matter how they are improved by the "treatment," always remain a relative distance apart. Taking the copper, the results of which in the cast condition have already been given, the following two forms of after treatment show the survival of the variations due to casting temperature.

It is unnecessary to quote results of other forms of after treatment, the fact remains that, given equal treatment, the properties of alloys and metals are not brought to one level, a feature which intensifies the importance of casting at the correct or "fair" heat and also the singular behavior of the metal lead.

THE DETRIMENTAL INFLUENCE OF OXIDES ON SHEET METALS.

By Charles H. Proctor.

There cannot be any doubt that oxides, when present on the surface of sheets of the non-ferrous metals which are to be used for drawing purposes, have a detrimental influence. Several years ago the writer was in the employ of a large cutting-up concern, whose product was largely made up from the press-drawn variety of goods. One day in August he happened to be in the vicinity of one of the large drawing presses, when his attention was attracted to the constant breaking of the shells which were being drawn. Upon examination it was found that at some particular points of the metal the latter would seem to stretch and break, instead of drawing evenly as it should have done. On further examination of the coils of brass which were used a very copious film of oxide of a dark olive green and blackish color was noticed. Wherever this color was found the metal would invariably stretch in length.

On asking the foreman of the particular department

about the peculiar manner in which the metal was acting, the writer was informed that it was poor metal or that the metal was not annealed properly and was harder in some spots than in others and that this caused the trouble. The writer was of a different opinion. He asked the foreman to let him take a couple of coils of the metal and repickle them, in order to remove the oxide, and then pass them through a solution to prevent further oxidation. This was done, and the writer's opinion, namely that the trouble was primarily due to the presence of oxide, proved to be correct.

Some time later, during very warm weather, when the writer was in conversation with a foreman of a large rolling mill in the vicinity, the conversation drifted to sheet metals, and the foreman related to him a peculiar incident in regard to some low brass metal which had been returned from a large customer. The latter claimed that the metal was not up to the previous standard and that it would not stand working. On the arrival of the metal a critical examination was made and, as far as could be ascertained, the metal was fully up to the standard of previous shipments. The circumstances seemed to agree with the previous experience of the writer and he told the forman about the latter. The next day, following out the instructions which were given by the writer, the oxide was removed from several coils of the metal and they were passed through a solution suggested to prevent oxidation. They were then reshipped to the consumer with a request to report the results. When the answer came back, it was stated that the metal was all right and seemed fully up to the standard of shipments received previous to the last. It was asked to have the balance of the order shipped as soon as possible.

It is, therefore, evident that oxides upon the surface of the metal exert great influence upon its drawing qualities. The customers often complain to the mill that the metal is poor and that it does not work properly. While the writer does not assume that the formation of oxides is the cause in every case, it is nevertheless a fact, that in many instances it may prove to be the correct one. This would be especially the case in summer time, when the hot moist atmosphere has a great oxidizing influence upon the metals composed of alloys of copper and zinc. The formation may also be due to the use of river water or water from other sources becoming impregnated with organic and mineral matter and to the sulphuric acid pickle wash-waters. When the sulphuric acid pickling solution becomes partly saturated with the oxides of copper formed in annealing and this is carried over into the wash waters too excessively, oxides are again formed, which become very hard in drying.

A good method for using in mills where this danger is liable to exist, especially in hot weather with a long continued drought, when water becomes somewhat scarce, is to use a nearly boiling solution of fish oil soap, otherwise termed "plater's compound." One-quarter pound of this soap is used to each gallon of water. The solution should be maintained near the boiling point by the aid of steam coils. The metal is pickled and washed in the usual manner and passed through this solution. This operation will cause the metal to dry almost instantly, and it saves quite an item in the cost of drying material used. This operation leaves an imperceptible film of grease upon the metal, which not only prevents oxidation to a great extent, but makes the metal cleaner and brighter looking.

The imports of copper from the United States into France during the first two months of 1905 had a value of over $3,000,000. Nearly $25,000 worth of lead was also imported during the same period.

AN ARTISTIC CHANDELIER.

The accompanying reproduction of a pen and ink drawing shows a design of a chandelier by A. E. Geils, for the main entrance hall of the home of a New York millionaire. The chandelier was made of hammered and cast brass, and had a drop of six feet. Ground

glass balls seven inches in diameter were attached to each drop. The spread from center to center was 22 inches. The style was German Renaissance, and the work was very finely chased. This chandelier was finished in dull brass, while others were produced in verde antique and the black iron finish. The contract for the entire chandelier work amounted to $10,000.

The National Amalgamated Society of Brassworkers, whose headquarters are in Birmingham, has received a legacy of $5,000, the interest of which is to be applied to the superannuation fund.

A NEW PROCESS FOR THE ROYAL COPPER FINISH.

By Louis Schulte.

The royal copper finish for some time past has been attracting considerable attention. When the finish first came on the market, the process of producing it was surrounded with much secrecy and high prices were obtained for the articles treated with it. To-day, however, numerous articles are finished in this manner.

The royal copper finish can be produced in various ways. One method consists in polishing the goods well and then dipping them successively into potash solution, water and potassium cyanide. They are then washed again in water and are then covered with a thin deposit of lead in a lead bath of ordinary composition. The goods are left about a minute in the bath, using a voltage of 2 to 2½ volts. They are then well rinsed in clean water, care being taken that no solution is left on the articles, as this would produce spots. The goods are then, without drying them, heated in the muffle or with the blowpipe to a dark red heat. When they show an even red, the heating is stopped and the goods are left to cool off, or they are immersed directly after heating into water. This procedure does not hurt the articles. They are then polished and it is a proof for the good quality of the oxidation that the goods can stand strong polishing.

The second method is somewhat simpler, but does not show any marked advantages as compared with the first. The well polished copper articles are painted, by means of a brush, as evenly as possible with a mixture of ordinary oil and lead oxide and then heated as described above. They are then polished as usual.

It is, however, possible to obtain different colors, such as brown-yellow, light brown to dark red and stable iridescent colors easily by the following method. The polished copper articles are first cleaned of all grease by means of hot kalye or potash solution. They are then dipped into potassium cyanide and rinsed off in water. They are then hung as anodes into a bath, which is made up from four parts of litharge and fifteen parts of caustic potash, dissolved by boiling in 100 parts of water. After all the litharge has been dissolved, the boiling is stopped and the bath is allowed to cool. The clear solution is then syphoned off from the yellow precipitate. The latter has no value and can be thrown away.

The bath is now ready for use. As kathodes there are used strips of sheet lead, which are connected with the negative pole of the battery or dynamo. The articles to be treated are connected as anodes, as mentioned above. If now a medium strong current is allowed to pass through the solution, the articles cover themselves with peroxide of lead. This deposit sticks very well to the goods and does not scale off during the subsequent heating and polishing, as happens very frequently and daily when the process of electro depositing lead upon them is employed. Especially with larger articles, which have deep parts, it is very often necessary to repeat the process several times, a procedure which does not only take much time, but is also quite costly.

The reason why the burnt-in lead deposit scales off so frequently during polishing, especially from the corners and edges of the goods, is due to the peculiar quality of the deposited lead. In general it is quite easy to deposit lead from alkaline solutions. For flat articles a pressure of two volts is sufficient, but for deep end hollow articles a higher voltage is requisite. In consequence, the deposit at the edges and corners of the articles, which are located opposite to the anodes, is apt to be formed too quickly and in a loose, powdery condition. This is especially liable to happen before the deep parts of the articles have received a sufficient deposit. This loose deposit is therefore very apt to scale off when the goods are subsequently heated and polished. The plater then blames the polisher, who he thinks polished the goods too strongly on the edges, and the polisher advises the plater to clean the articles better, etc. The whole trouble, however, was due to the conditions of the current between the anode and kathode.

If the work, on the other hand, is carried out in a bath of the composition mentioned above, and with the reversed current, the above trouble does not have to be feared, inasmuch as the lead peroxide, which deposits at the anodes, has a much finer structure than the lead deposit obtained at the kathode. The goods, which are hung as anodes into the bath, cover themselves, when the conditions of current are right, directly with iridescent colors (Nobili rings), at first yellow, then green, red, violet, and blue, and at last brown. The last color gives an even, bright red tone, the true royal copper. The preceding colors can, however, also be burnt in without any trouble, and can be very well used for fancy novelties. It is possible, by experimenting somewhat, to obtain color effects, which even surpass the Japanese oxidation effects.

Hard soldered articles and solid brass goods can also be finished in this manner in royal copper, after they have received a sufficiently strong deposit of copper in the acid copper bath. The brass goods are first coppered and then buffed. The best results are obtained in a slightly acid copper bath with additions of glue and nitric acid.

NEW COLD-GALVANIZING BATH.

A new solution for cold galvanizing has recently been patented by E. D. Kendall, of Brooklyn, which presents quite a departure from the usual baths, inasmuch as it contains zinc sulpho-glycerate. The solution is preferably prepared by first acting on anhydrous or nearly anhydrous glycerol with strong sulphuric acid, with or without the application of heat, so as to form sulpho-glyceric acid. This is then diluted with a limited quantity of water and then saturated with zinc, by agitating it with an excess of zinc oxide or zinc hydroxide. If a somewhat concentrated solution of this zinc sulphoglycerate be used as electrolyte, the liquid is stated to have a high electrical conductivity, and an electric current of even less than one volt, when a zinc anode is used, will suffice for a rapid deposition of zinc. With a more dilute solution, two to three volts are preferable, unless the conductivity of the bath is increased by sodium sulphate.

In gilding or gold plating the object, in contrast to the deposition of other metals, is to get the desired finish as quickly as possible with the expenditure of as little gold as can possibly be used.

The metal calcium in the market contains as impurities most frequently 0.2 to 0.5 per cent. of silicon, 0.25 to 0.30 per cent. of aluminum and traces of iron. The specific weight of pure calcium metal is 1.52, but in commercial metal it goes frequently up to 1.59 owing to the presence of silicon.

THE BROWN FINISH ON GUN BARRELS.

By Charles H. Proctor.

Several methods of producing this finish may be used which will give very good results. One of them is the so-called sponge method. In carrying this method out the barrels have to be cleaned so that they are free from grease and a bright surface has to be produced. Any of the usual methods may be employed for this purpose. The barrels are cleaned by potash or sodium carbonate and are then treated with diluted hydrochloric acid. A solution—made up from sulphate of copper, 1 part; water, 30 parts; sulphuric acid, ½ to 1 part—is then applied as rapidly as possible to the cleaned barrels with the aid of a sponge. The barrel itself is used as a kathode for receiving the deposit of copper. A very good coating of copper is obtained in this way, which is properly washed afterwards. A solution made up from ¼ oz. potassium sulphide in one gallon of water, which solution is used warm, is then sponged as rapidly as possible over the gun barrel. This solution will produce the brown tone. The articles are then passed through boiling water or through any other means for drying, this operation being performed as rapidly as possible. The articles are then polished with the aid of Canton flannel or a very soft brass scratch-brush, after which they are lacquered or waxed by using a mixture of beeswax and turpentine dissolved to the consistency of shoe polish. This is applied as thinly as possible and polished with Canton flannel.

Another method consists in applying, after cleaning the articles as mentioned previously, a solution composed of copper sulphate, 1 oz.; spirits of nitre, 1 oz., and water, 20 oz. This is applied as before, but should remain on the barrels for 24 hours. It is then brushed with a stiff brush, and if the color is not dark enough the operation is repeated. The barrels are then afterwards lacquered or waxed as mentioned above.

The English gun makers use a formula made up from chloride or antimony and olive oil in equal parts, to which are added a few drops of nitric acid. The barrel is slightly warmed and the mixture applied by a rag or sponge and is allowed to remain until the color is satisfactory. The gun barrels are then lacquered, waxed or dried as before.

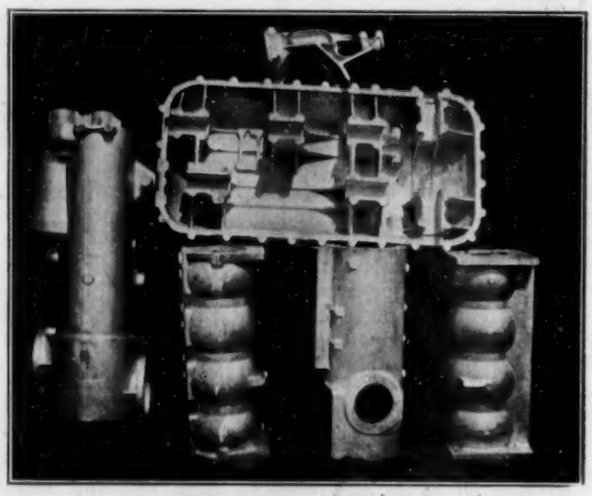
POLISHING MACHINERY NAME PLATES.

To polish machinery name plates without rounding off the edges the plates are polished on a hand emery wheel made up from a wooden disk and covered with leather. The emery coating is applied by using glue mixed with water and wood alcohol and then rolling the wheel in emery and setting it aside to thoroughly dry. No. 60 emery is used for roughing and No. 100 for finishing. A chuck to hold the plates for polishing is made from hard wood, burning in the desired depth with a red hot plate of the size to be polished. This enables the polisher to give a straight sweep to his work and to keep the corners square. If the plates have to be buffed after polishing an iron chuck should be made similar to the wooden chuck. In order to obtain the best results on this kind of work a Gardner Disc Grinder should be used, as a boy can accomplish on these machines three times as much as an experienced polisher. The disks are made to do the very roughest and very finest work on flat surfaces. Dealers in platers' supplies can supply the wooden leather-covered wheels.

It is estimated that in Germany about 15,000 to 20,000 tons of old copper pass back annually into consumption.

TEST OF ALUMINUM CASTINGS.

Articles cast from aluminum are now used for a variety of purposes, where they have replaced the heavier metals. Many of them, as far as intricacy of pattern and appearance of the metal is concerned, are certainly fine specimens of the molder's and the caster's art. What complicated patterns can be produced, can be seen in the accompanying illustration, which shows some automobile castings, manufactured by the Light Manufacturing and Foundry Company, of Pottstown, Pa. This concern has succeeded in producing castings of considerable tensile strength, as is shown by the following results of tests of their automobile brand green sand castings. The tests were made at the Watertown arsenal, with the United States testing machine, of a capacity of 800,000 lbs.



AUTOMOBILE CASTINGS.

ROUND SPECIMEN, NOT TURNED.

Diameter of stem, ".78.
Sectional area, .478 square in.
Elastic limit, approximate, 12,500 lbs. = 26,150 lbs. per sq. in.
Tensile strength, 14,100 lbs. = 29,500 lbs. per sq. in.
Elongation, ".05 in 10" = 0.5 per cent.
Contraction of area, inappreciable.
Appearance of fracture, light gray, amorphous.

SPECIMEN HEATED BETWEEN HOT, GROOVED BARS, TO AN ESTIMATED TEMPERATURE OF 150° FAHR.

Length of bars, 10".
Diameter of stem, 1".016.
Sectional area, .811 sq. in.
Tensile strength, 20,800 lbs. = 25,650 lbs. per sq. in.

PLAIN BAR.

Sectional area, ."932 x ."463 = .455 sq. in.
Tensile strength, 11,400 lbs. = 20,050 lbs. per sq. in.
Contraction of area, inappreciable.
Appearance of fracture, light gray amorphous.

The total world's production of spelter in 1904 amounted to 609,971 long tons, of which 157,901 tons were produced in the United States.

The course of the zinc prices during 1904 showed that consumption kept pace with production, though over the world's production increased more than 11 per cent.

GOLD ALLOYS FOR JEWELERS.

By F. B. Forster.

Manufacturing jewelers procure their fine gold and silver from some reputable asaying house, and then produce the alloys required for the goods they make. Some buy old gold or old silver, melt it, refine it and add the metal they desire to make the proper alloy. The results are often unsatisfactory, and the better way is to purchase fine gold from the U. S. Assaying Office, because it is always of the same standard quality, which cannot be said of private establishments.

Gold in its pure state, being so soft that it cannot be used for manufacturing purposes, must be mixed with other metals, which make it harder, change its color and influence its ductile and tensile quality. Different metals act differently on these qualities of the gold; thus a 1/9000 part of antimony, lead, bismuth or arsenic makes the gold unfit for minting purposes. It is therefore important for the manufacturing jeweler to know the exact effects of the different metals to be used as alloys for his gold, as well as the quantities to be used, in order to get certain results.

The best known metals for alloying with fine gold are copper and silver, which ought to be chemically pure. Generally the copper used contains a small percentage of iron as an impurity, which gives rise to blisters and gray spots in the finished article. Alloys of gold and copper give what is known to the trade as red gold, the color depending on the quantity of copper used. If, for instance, a high colored gold is required, the alloy must be 3 parts fine gold, 1.5 parts copper. A lighter colored gold is obtained by using fine gold and fine silver, but no copper. Gold of the color of sulphur yellow is a combination of 6 parts fine gold, 1 part fine silver, but if the formula is varied to 1 part fine gold and 1 part fine silver, the result will be a bluish-green gold. Should a leaf green gold be required, the formula is 4 parts fine gold, 1 part fine silver and 0.5 parts cadmium.

The ease with which articles of base metal can be given the appearance of fine gold has occasioned the legal requirement to have the manufactured gold goods stamped with the fineness or caratage of the gold used, so that the buyers may be protected. Goods are made as low as 5 carat gold, but 9 carat gold is generally used in cheap jewelry, and from that up to 14 carats, which is about the standard. Fine watch cases, however, are often made of 18 carat gold, but very rarely higher, because the gold would be to soft.

An article made of 9 carat gold means that it contains 374.999 fine gold in 1,000 parts, each carat being 041.667 of fine gold in 1,000 parts, while the other components are silver or coper in certain proportions. By varying the respective amounts of silver and copper, or either of them, with any desired carat of fine gold, the manufacturer has it in his power to vary the color of his gold from yellow to reddish, red, very red, green, bluish green, etc., but the fine gold is a fixed quantity for the carat to be obtained. A 14 carat piece of gold must always contain 583 parts of fine gold in 1,000 parts of gold, but by varying the added alloys the color of the 14 carat piece of gold will vary. It is easy to see that very beautiful combinations of colors may be obtained for special work by the progressive jeweler, but the melting and the amalgamation has a great deal to do with the success of the final result. Especially is this true where cadmium, brass, steel and palladium are used, which are all employed in the making of certain colors in gold alloys. I mentioned above a green alloy into which cadmium entered, but too much would spoil the alloy and make the gold brittle. Besides it is not easily managed, unless one knows how, although the results are fine.

In conclusion I give some well tested alloys for different colored gold, which may be of interest to some reader.

YELLOW GOLD ALLOYS.

	Gold.	Silver.	Copper.
No. 1.....	1	2	—
No. 2.....	4	3	1
No. 3.....	14.7	7	6
No. 4.....	14.7	9	4

Alloy No. 1 is pale yellow, the others show full yellow gold colors.

RED GOLD ALLOYS.

	Gold.	Silver.	Copper.
No. 1.....	3	1	1
No. 2.....	10	1	4
No. 3.....	1	—	1
No. 4.....	1	—	2

Nos. 1 and 2 give a pale red and a rose red alloy. Nos. 3 and 4 give red and high red colors.

BLUE, GRAY AND BROWN GOLD ALLOYS.

	Gold.	Silver.	Copper.	Steel.	Palladium.
No. 1.....	2	—	—	1	—
No. 2.....	30	3	—	2	—
No. 3.....	4	—	—	1	—
No. 4.....	29	11	—	—	—
No. 5.....	18	11	13	—	6

No. 1 shows a distinctly blue color; Nos. 2, 3, 4 are bluish gray to pure gray; No. 5 is brownish and hard.

The gold alloys for gold pens and for dental purposes cannot be considered here.

REMOVING THE FIRE-COAT FROM SILVER.

By Edward E. Newton.

The so-called fire-coat is the result of the copper used in alloying silver coming to the surface from constant annealing and forming oxide of copper. If this is not removed, the work will have a bluish appearance, tarnishes very easily and will not take a high polish. The two best methods for removing it, as I have found, are, (1) by the use of a regular acid dip, and (2) by an alkaline solution used in conjunction with the dynamo.

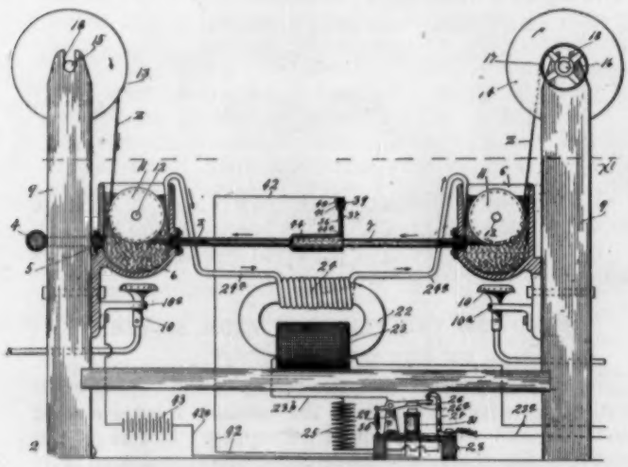
In applying the first method, equal parts of nitric acid and water are taken, mixed together, and the solution is used hot. When the work is immersed into this solution, it will almost immediately turn black. It then gradually changes color to a light gray, as the fire-coat disappears. It is then rinsed in clear water so as to remove all acid and scratch brushed. Great care should be taken not to leave the work in the solution too long. Just as soon as the black coating disappears, the work should be removed at once from the solution. When brushed, the work will have a fine white color and will take a high polish.

The other method for removing the fire-coat by the use of the dynamo is carried out as follows. Eight ounces of yellow prussiate of potash are dissolved in one gallon of water and fourteen ounces of cyanide of potassium are then added. When all is dissolved, the solution is ready for use. The best results are obtained by using iron anodes, with a strong current. After the work is wired it is hung from the positive pole, using the negative pole for the iron anodes. The latter, of course, act as kathodes in this instance. The work will commence to darken in color and will then gradually change to a grayish color, when the fire-coat is removed.

Working with this solution presents an advantage in one way, inasmuch as there are no acid fumes to contend with as there are in the first method. It takes, however, a much longer time to do the work. I prefer to use the acid dip with proper facilities for carrying off the fumes, which arise as soon as the work is immersed in the hot acid.

NEW APPARATUS FOR GALVANIZING WIRES.

An apparatus for effecting the galvanizing or otherwise plating of wires was recently patented by G. A. Goodson, of Providence, R. I., with U. S. patent 789215, May 9, 1905. As shown in the illustration, which pictures the apparatus in cross section, it is composed of a number of kettles in which the molten metal, with which the material is to be coated, is kept. Two of these kettles, 6, 6, are visible in the figure. Each two opposite kettles are connected by an approximately horizontal tube. The wire which is to be galvanized or tinned is supplied from a reel 13, and is wound onto a reel 14, after it has been plated. In order to guide the wire through the plating tubes, guide sheaves are located in the kettles, so arranged that they will guide the wire axially through the tubes without its coming into contact with their sides.



APPARATUS FOR GALVANIZING WIRES.

The plating tubes are constructed of a metal such as iron, which is an electrical conductor, and they are heated electrically by means of transformers 22 and leads 24a. Each melting kettle is fed by a supply tube, branching off from a general feed tube which leads to the main melting pot for the metal. The latter pot may be located outside of the room in which the galvanizing is done.

By means of electricity and a magnet 31 provision is made to automatically regulate the extent of the heating which the galvanizing tube receives, so that the coating metal may be automatically maintained at the exact temperature required for the best grade of plating. By this method it is claimed to be easy to maintain the molten bath at its requisite temperature, while oxidation of the metal is avoided.

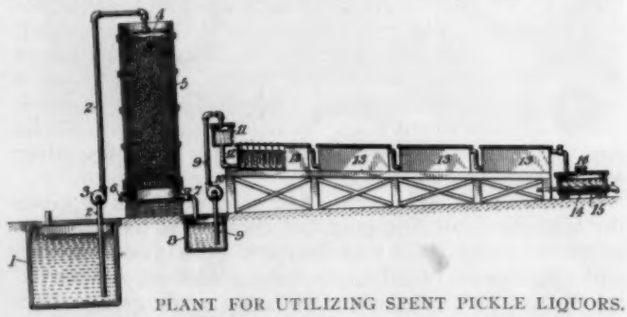
THE PRODUCTION OF THIN BRONZE PLATES.

Metal printings on paper, leather, etc., have been usually obtained by using sheet metal and a suitable binding agent and adhesive. With fine ornaments, however, or very small letters, the parts do not come out sharp enough. Such stampings have therefore been produced by powdering the part to be treated with bronze powder and then pressing a die upon it. In the latter case, however, the stampings have a dead appearance.

In a patent issued on May 2, 1905, Ernst Oeser, of Schoeneberg, near Berlin, Germany, claims to be enabled to quickly and conveniently produce polished metal stampings by means of bronze or metal powder, by combining the metal powder with a thin layer of color. The manufacture of such thin bronze plates is carried out by laying the color mass thinly on a glass plate, and then scattering the mass over with bronze powder through a suitable sifting device. When dry the superfluous bronze powder is removed with a soft brush and the thin layer thus produced is taken off with a pallet knife. The mass which is used as a substratum is composed of size, glycerin, a suitable powdered color—such as zinc white, ocher or the like—water and albumen. It is stated that the mass not only acts as support, but also as a grounding and binding agent, and gives the bronze powder the necessary polish on stamping. Various colored bronzes may be used, and if necessary may be laid on the already painted layer in such a manner that the color becomes iridescent and the articles thus obtain the iridescent effect.

UTILIZING SPENT PICKLE LIQUOR.

A method recently proposed for utilizing spent pickle liquors depends upon the use of sulphur dioxide, with which the pickling liquor is saturated. It is applicable to the utilization of ferrous sulphate liquors from the pickling of iron, but also to metal bearing solutions obtained by pickling copper and other metals. The process is carried out in a series of apparatus as shown in the accompanying illustration. The spent pickle liquor is collected in the storage tank 1, whence it passes through pipe 2 into an absorption tower 5, filled with coke, into which the sulphur dioxide gas enters at the bottom through pipe 6. The acid liquor which now contains sulphuric and sulphurous acid flows through pipe 7 into



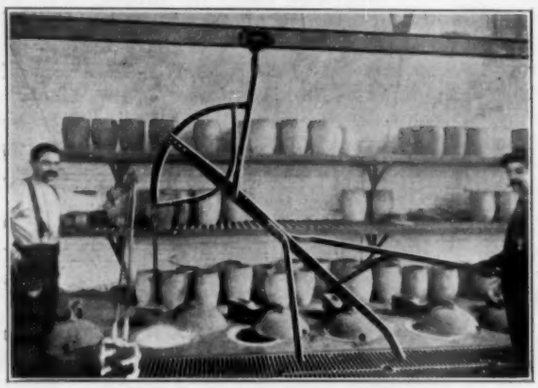
PLANT FOR UTILIZING SPENT PICKLE LIQUORS.

a reservoir 8 and thence by pipe 9 and tank 11 and pipe 12 into a series of electrolytic vats 13. In these vats the liquor is passed between a series of anodes and cathodes, the latter hanging down from the cover. The anodes are connected to the lining 20 of the vat, which is preferably of lead. The metal contained in the spent liquors is deposited and free acid formed, the resulting regenerated liquor overflowing into a tank 14, whence it can be withdrawn for further use in the pickling of metal. The vats are so constructed as to permit a sinuous flow of the liquor past the electrodes. The process was patented by A. S. Ramage, of Detroit, Mich., with U. S. patent 788064, April 25, 1905.

The causes of the deterioration of platinum have been studied by W. Campbell. He finds that the chief causes of the deterioration seem to be its volatility and the fact that heating above 1.000 degrees C. for any length of time causes brittleness. The brittleness may be due to crystallization, to the formation of compounds, or the evolution of gases. He considers the matter particularly as it affects the use of the metal in resistance thermometers and thermocouples. The greatest alteration is caused by heating in a reducing atmosphere in presence of silicious material.

A NEW CRUCIBLE LIFT.

One of the laborious operations of most brass foundries is the lifting of a pot of scorching metal out of a furnace. A number of devices have been designed to make easy this operation, and one of the latest, which is said to be the handiest of all, is the Climax lever lifter shown in cut. It consists of an I-beam supporting trolleys from which are suspended levers provided with three handles at one end and a quadrant at the other. The quadrant is made of angle iron and carries a chain with a hook at one end, which can be secured to the lifting tongs. By this means



THE ALLYNE CLIMAX CRUCIBLE LIFT.

the lifting power necessary to pull out any sized crucible is reduced to a minimum. The device was adopted for brass foundry work after carefully considering every other kind of apparatus in use for this purpose. It is stated that the Climax lever lifter does away with all the hardships and dangers to the operators, is not expensive, and it will undoubtedly interest all brass foundry foremen. The lift is manufactured and put on the market by the J. D. Smith Foundry Supply Company, of Cleveland, Ohio, who for a number of years have manufactured and sold all kinds of foundry supplies. Further particulars and prices of the Climax may be had of the manufacturers.

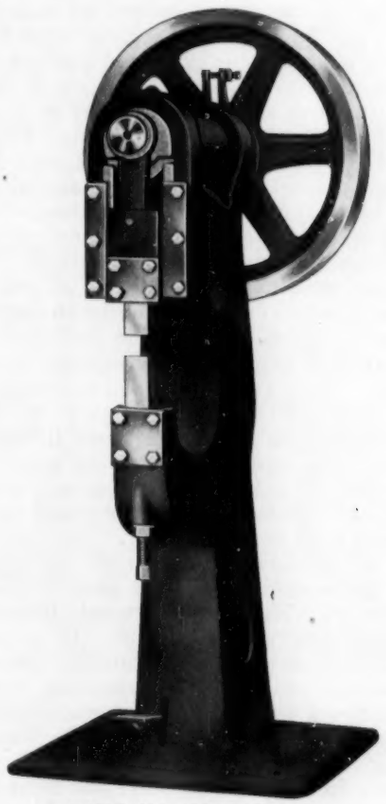
SILOXICON FURNACE LININGS.

Within the last few years a material called siloxicon, produced by Mr. E. G. Acheson, in the electric furnace, which has high heat resisting qualities, has been used in increasing quantities for brass furnace and other metallurgical furnace linings. The material is very refractory at high temperatures, is insoluble in iron and is not affected by acid and basic slags. Mr. Acheson in a recent patent, April 18, 1905, protects the method of making this siloxicon into refractory bodies. As the material is self binding, the use of a separate binding agent is not essential to the production of a coherent product.

The process of producing a furnace-lining, for instance, of siloxicon consists in grinding the material to the desired fineness, moistening it with water, bringing it into the desired shape, and firing it. If the article it is desired to form from siloxicon be heavy or of complex form, the ground siloxicon is moistened with a solution of glue or another suitable temporary binder. The temperature at which the product should be fired, should be approximately 2,000 deg. Fahrenheit, or sufficient to develop the self-binding effect of the material and to substantially eliminate the temporary binder. The latter should be gotten rid of as completely as possible, inasmuch as a mass or article containing such a residue is less refractory than siloxicon at high temperatures and in the presence of active chemical reagents.

IMPROVED POWER SPRUE CUTTER.

An improvement in their power sprue cutter has recently been made by the Waterbury Farrel Foundry and Machine Company, of Waterbury, Conn. This improvement consists in attaching an adjusting screw beneath the lower blade for the purpose of adjusting the cutters to take up the wear, as shown in cut. In designing the machine the builders have taken special pains to secure good proportions throughout combined with sufficient strength to cut any reasonable amount of metal. The throat is large, giving ample room for conveniently handling brass castings. The machine will cut with ease a sprue ¾ in. square. To operate it the foot treadle is held down until the cut is finished. Some of the particulars of this machine are as follows:



IMPROVED SPRUE CUTTER.

Stroke			1¾	inches.
Distance from front of cutters back to frame			12	"
Distance from top of lower cutter-holder to bottom of guides			10¼	"
Size of lower cutter	1¼	×	2¼	"
Size of upper cutter	⅞	×	2¼	"
Diameter and face of fly-wheel	30	×	4¼	"
Floor space	34	×	30	"
Total height			37½	"
Weight of fly-wheel			320	lbs.
Weight of press			1,860	"

Platinum and metals of the platinum group have been found to occur in the placer gravel in the Cariboo District in British Columbia. The metals of the platinum group are found in minute metallic grains.

CORRESPONDENCE DEPARTMENT

In this Department we will answer any question relating to the non-ferrous metals and alloys. Address THE METAL INDUSTRY, 61 Beekman St., New York.

Q. A plater asks for a dip to remove oxide from work such as German silver, which has been soldered with the ordinary soft solder. In dipping such work his solder blackens.

A. A 10 per cent. solution of cyanide of potassium used warm should prove satisfactory for removing the oxide from brass or German silver after soft soldering. This solution will not affect the solder. A boiling solution of plater's compound may also be used, which is made up in the following manner: Four ounces of plater's compound are dissolved to each gallon of water used, and one ounce of cyanide of potassium is added. This solution will clean and remove the oxide at the same time.

Q. A plating firm asks for a method of producing a bright finish on small flat steel stampings, such as suspender buckles, after they have been stamped and before they are nickel plated. The material is to be handled in lots of 5,000 to 10,000 at a time. Tumbling does not make the articles bright enough.

A. When handling goods of this description it is customary to purchase the steel polished on one or both sides, as necessary. This saves quite an expense and if the goods are cleaned in benzine and tumbled with leather scraps and crocus a good surface is produced on the goods. They have, of course, to be tumbled for a sufficient length of time.

The case hardening method is used by some concerns and is carried out in the following manner: The articles are placed in iron pots and arranged between layers of animal charcoal. The pot is closed by a cover, which is luted tight with fire clay. The pot is then brought to a cherry red, after which the cover is removed and the contents of the pot dumped into a vessel containing oil. They are afterwards tumbled with leather scraps, flour emery and oil. In order to remove the grease they are then tumbled in sawdust. The articles are finished by tumbling them with leather meal and a small amount of crocus.

Q. A brass founder inquires about the best method for producing the gun metal finish on steel.

A. The gun metal finish on steel has been successfully produced by the following method: Dissolve two pounds white arsenic in one gallon of hot muriatic acid and eight ounces of chloride of nickel. From one to two ounces of cold water are then added to the above mixture. Any old scrap wrought iron which is sufficiently clean may then be procured and immersed for several hours in this solution. It is then taken out and the necessary amount of iron which should be present in the solution is thus provided. Anodes of iron and nickel should be used with a low current. The articles must be slightly coppered or nickeled. The scratch brush effect gives the best results. The articles must be afterwards lacquered.

Q. A brass founder inquires about the best method to prevent scabbing on heavy castings. He has been making some cross-head shoes, the larger ones of which weigh nine pounds, and all of them scab in the drag, while the top of the face is dirty. The small shoes are clean and both sides smooth. He has been using old bearings and valves, has kept the crucible covered all the time and has had the metal skimmed while pouring.

A. Better results might be obtained by using a coarser sand mixed with a good percentage of new sand. The ramming should be done as light as the sand will hold in the flask. The mold should be well vented and a riser should be put at the opposite end from where the casting is gated up through the cope. The mold should be tipped about 2½ inches, the high end to be on the sprue end. The metal ought to be poured quite down, care being taken that the metal is not overheated. The molds should also be ready for pouring as soon as the metal is at the proper heat. If the above does not prove satisfactory try using a beer facing and dry out thoroughly before closing the mold, or paint the mold with dry graphite.

Q. A foundry firm asks whether it is possible to tin gray castings by dipping without first putting on a coat of copper, and, if so, would like to know the method used.

A. It is not necessary to copperplate gray iron castings in order to tin them afterwards. The usual method consists in cleaning the iron with a pickle composed of one part hydroflouric acid to ten parts of water. The pickling takes from 15 to 30 minutes in order to remove the sand. The articles are then thoroughly washed in water and immersed in a 10 per cent. solution of ammonia water or carbonate of soda in order to neutralize the acid which may be contained in the pores of the mold. Provision should be made to heat the articles quite hot, so that when they are passed through the flux, composed of a concentrated solution of chloride of zinc, they will dry very rapidly. They are then immersed in the molten tin by the aid of iron hooks. When the goods are small they are placed in baskets made of coarse iron wire, with as large a mesh as possible. The excess of tin is removed by rapidly shaking the articles. They are then passed through a bath of molten tallow, which keeps the tin bright. The tallow is kept in a fluid condition by the heat of the articles.

Q. The same firm state that they are dipping a steel press, large size, 9 x 12. They would like to know how their brick structure should be built and what should be the size of the iron tank.

A. An oblong iron tank with a 3-inch flange, 12 x 18 x 18 inches, should be sufficiently large for the purpose. It might be set in a double brick wall as near to the fire as possible in order to obtain a good draft. Provision should be made for the regulation of the latter, so as to make it possible to retain an even temperature.

Q. A plating firm asks for a solution for brass plating on gray iron castings at a low cost, without the necessity of the articles having to be buffed or scratch brushed.

A. The desired results may be obtained in three ways. In the first method the goods should be dipped as rapidly as possible through the usual bright dipping acid bath composed of sulphuric acid 1½ parts, aqua fortis 1 part and salt 1-10 part, reduced with water for desired results. Arsenic should not be used in a brass bath when the goods are to be brightened by dipping, as the deposit of dead color works best for dipping. The second method consists in tumbling the work, while depositing in the solution. This procedure gives good results and a bright deposit. The third method

consists in first covering the articles with a good deposit of copper and then running them through the acid dip, after which they are placed in the brass bath for from 5 to 10 minutes. This method gives a good, bright surface for the brass coating and is used very successfully. The coating will have a buffed appearance if the operation of plating has not been carried on too long.

Q. A plating firm wants information as to how to make a solution for antique green to be used on solid gold lockets, rings, etc. They refer to lockets, etc., colored rose and green combined and also partly Roman. They want the recipe either for electroplating, printing or lacquering.

A. The usual solution for producing greenish antique shades on gold is made up of picric acid 2 ounces, wood alcohol 4 ounces. The solution is applied slightly warm with a small brush. After drying the articles are relieved with alcohol and slightly brushed. Dusting powders are used, consisting of finely divided rotten stone, umber, oxide of iron and lamp black applied in alcohol in the same manner. These powders are used in parts of the back grounds to give shaded effects. It is possible, if the article is rose gold, to relieve for roman gold and to produce antique shaded effects in this manner. Fine artists' water colors may also be used, using water size made from isinglass dissolved in water to mix up the colors. The latter, when dry, have the dull appearance of oxidized colors and give a very good effect.

Q. A subscriber wants to know the composition of underwriter's metal.

A. The so-called underwriter's metal is a fusible alloy consisting of bismuth 8 parts, lead 5 parts and tin 3 parts, which melts at 202 degrees Fahrenheit.

READERS' OPINIONS.

Correspondence is solicited from all of our readers on subjects relating to the founding, finishing, rolling and plating of the non-ferrous metals and alloys. Name and address must be given, though not necessarily for publication. Address THE METAL INDUSTRY, 61 Beekman street, New York.

METAL COLORING.

To the Editor of THE METAL INDUSTRY:

I would like to take exception to an opinion which is sometimes expressed, that there is no skill required to paint an article beyond that which any decorator should possess and that the painting of metallic articles is not a process of any particular value, such work being usually associated with the cheapest kind of ware. I am of the opinion that the art of painting metallic articles has perhaps more depth to it than even the whole of the art of deposition of metals. We can easily understand that when we look at the beautiful bronze figures and the works of art in metal that emanate from Paris, Berlin and Vienna and other art centers, productions which are masterpieces in decoration and color. Many reproductions of metal articles made centuries ago are made by the plater and bronzer in colors closely imitating those with which nature herself has adorned them, the work being accomplished by skilled workmen with the aid of the brush. The plater who is enabled to finish a copy of such a work of art, plate it, color it and bronze it in order to bring out the subdued color of light and shade, which nature alone produces, must be something more than a common painter; he must be something akin to an artist.

CHARLES H. PROCTOR.

AN ENGLISH OPINION OF AN AMERICAN FURNACE.

The Monarch Engineering and Manufacturing Company, of Baltimore, Md., are very much pleased with the progress they are making with their new crucible melting furnace, the fuel for which is oil or gas. The company have recently received a number of letters of recommendation of the furnace, but one with which they are particularly pleased is a letter to the Editor of the *Foundry Trades Journal*, of England. It expresses the opinion of an English user of this American furnace. A complete copy of the letter follows:

KEIGHLEY, England, March 23, 1905.

To the Editor of The Foundry Trades Journal:

Sir.—With regard to the article which lately appeared in your journal on the subject of the "Steel Harvey Furnace," in which you mention that we were putting down the first one in this country, we think it may interest your readers to know something about our experience in the working of it. At first, of course, we had some difficulty in getting the right class of oil; after a few trials, however, we got the furnace working satisfactorily, and as the result we consider it fulfills what is claimed for it by Messrs. J. W. Jackman & Co., Ltd.

The furnace we have put down is for 375 pounds crucible, and up to the time of writing the work done by this furnace is more than equal to that done by four coke furnaces previously used with 100 pounds crucibles. This means to us a reduction in the cost of melting and labor of more than 50 per cent., besides which the work done in this branch, instead of being finished as before at 6 o'clock, is now finished about 4 o'clock in the afternoon. This means a far greater output if we are working at full pressure.

The quality of the metal, which is a very special feature of our trade, is most satisfactory, being far purer than we have ever been able to get in with the ordinary coke furnaces.

With regard to the other advantages, the following are the most conspicuous:

No waste of metal, no ashes, very little attention when the furnace is started. This liberates the furnace men to help at other things. There are little or no fumes, which shows that there is complete combustion in the furnace, and there is a very great saving in crucibles. We have just taken out a 375 pound crucible, which has stood 61 heats, and melted over nine tons of metal.

With regard to the oil, we anticipate no difficulty in getting a proper supply at a low price, as our present oil merchants are prepared to contract for a supply in 10-ton lots at 2d. per gallon.

We have been paying up to now 2½d. per gallon for small quantities, and when we put down two more of these furnaces, which we certainly shall do shortly, we shall still further reduce our cost.

We have had many firms applying to us for our experience with this furnace, and, therefore, think that if you publish this letter it will give the prominence it rightly deserves.

Yours faithfully,
(Signed) JONAS WELLS.

A NEW ROLLING MILL.

The announcement is made of the incorporation of the Atlan Copper and Brass Company with a capital stock of $750,000, for the manufacture of brass and copper tubing, sheets, bars and wire products in copper and brass. It is stated that bids will shortly be asked for the erection of a plant and necessary machinery. The officers of the company are: James Hay, president; John C. Potter, vice-president and treasurer, and W. H. Albro, secretary. Temporary offices of the company are at 201 Ferguson Building, Pittsburgh, Pa.

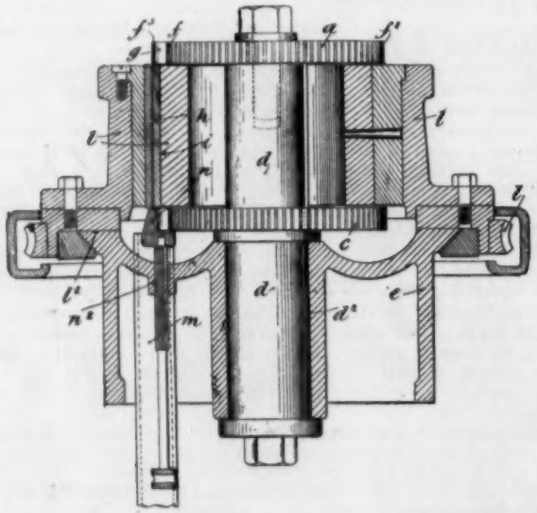
Edwin Harrison, vice-president of the Union Lead Company and one of the prominent citizens of St. Louis, Mo., died at his residence in that city May 13th. He was a member of the Legion of Honor and was especially interested in the manual training school of the Washington University of St. Louis.

It is reported that the copper wire manufacturers are considering the advisibility of forming a pool because of the shading prices by the wire manufacturers.

PATENTS

A full copy of any Patent mentioned will be furnished for Ten Cents. Address THE METAL INDUSTRY, 61 Beekman Street, New York

797,232, April 11, 1905. HINGE CUTTING MACHINE.—G. B. Taylor, Birmingham, England. The machine is adapted for facing the ends of butt hinge blanks and cutting the gaps in the knuckle parts of hinge blanks. When facing the ends, two cutters *a* and *c* are used, which sit on a supporting axis *d*, which is non-rotating in the central bearing d^2 of a circular table *e* forming the bed or base of the machine. The cutters are each an in-



complete active convolution of a spiral, having a space, as shown at *f*, *g*. f^1 cut out of them for the purpose of enabling the blanks to be fed in and taken from the pockets *i* of a work carrier *l*. The latter is supported upon the base *e* at l^2 and turned by a worm gear l^3, l^4. Each blank fed into the carrier *l* is faced on both its ends and is withdrawn from the carrier during one complete revolution of the carrier. When the machine is cutting the knuckle part of hinges it is provided with three cutters.

786,776. April 4, 1905. ELECTROPLATING APPARATUS. L. Potthoff, Flushing, N. Y. The apparatus is intended for continuously galvanizing bars, pipes, etc. It consists essentially of a tank, through which moves a chain, on which are mounted a number of detachable, insulated pins. The latter roll the work to be plated along guide bars, upon which it rests and which constitute the kathode. The anode is located below these guide bars. Arrangement is also made for coating the inside of tubes.

785,567, March 21, 1905. MOLDING PRESS.—G. J. Otto, Rochester, N. Y. The molding press comprises a table, a presser plate, spaced rack bars connected to the presser plate and mounted for movement with the presser plate toward and away from the table, a presser shaft having pinions engaged with the rack bars respectively, a presser-lever pivoted upon the presser shaft between the rack-bars and having a slotted head, a clutch wheel in the slot fixed to the presser shaft, a bolt slidably mounted in the head of the lever and disposed to engage the clutch wheel, means for holding the bolt normally and yieldably in engaging position and means connected with the lever for holding the latter yieldably with the presser plate. The object of the combination was to insure equal pressure at all points of the pressure plate and operating it without requiring the warkman to change his place at the front of the press.

787,701. April 18, 1905. PLATING APPARATUS. L. Schulte, Brooklyn, N. Y. The apparatus consists of a tank provided with two anodes, one of which is located above and the other below the movable kathode carrier. The latter is formed of a number of endless insulated cables, connected to each other by insulated transverse rods, which are provided with contact points. The apparatus is especially intended for plating sheets, band iron, wire, etc. The articles to be plated make electrical contact with the movable kathode by means of these contact points. If small articles are to be plated, they are placed in a perforated metallic tray.

788,673. May 2, 1905. MACHINE FOR MAKING SAND MOLDS FOR CASTING METALS. H. E. Pridmore, Chicago, Ill. The invention relates to improvements in sand molding machines in which the pattern is drawn from the sand by power applied through connecting devices. It refers more particularly to machines fitted with patterns in which there are depressions, in which, were the sand lifted vertically, the cohesion of the particles of sand might not be sufficient to sustain the large amount of sand present in the depressions of the pattern. In this apparatus the machine and the pattern, together with the sand, are turned over together with the sand and the machine and the pattern are then lifted from the sand. In the operation of the machine the sand is shoveled into the part of the flask that is placed upon the machine and is compressed into or about the pattern. The flask is then covered, a handle thrown against it and all the parts turned over onto a parting stand. A lower handle is released and the base plate immediately thrown back. The cope or drag is removed from the parting stand, another half flask is placed upon the machine, and the operation repeated.

789,342. May 9, 1905. PROCESS OF CONSTRUCTING SEAMLESS HOLLOW METAL ARTICLES. F. A. Voelke, Tipton, Ind. The process involves first the construction of a core or pattern of the desired form. A fusible metal, wax, paraffine or other suitable substance may be used to make the pattern. Air pressure is used during this operation, so as to force the wax or paraffine against the walls of the mold. The core thus obtained is then graphitized or otherwise prepared to obtain a metallic deposit in a plating solution. The article is then placed in an oven and the material of which the core had been made is melted out of the metal shell formed by the plated deposit. The fourth operation is performed by dipping the shell into a bath of a molten metal or alloy so as to build it up of successive layers.

785,908, March 28, 1905. SAND MOLDING MACHINE.—J. J. McClelland, London, England. The flasks in this machine are carried by trolleys, which run on tracks beneath a rammer head, for ramming tight the sand in the flasks. The figure shows a fencing *a* overhanging a track *h* and supporting a rammer head *c*. The latter is worked by a rock-lever *d*, coupled by link *e* to piston rod *f* of a compressed-air cylinder; *g* *g'* are trolleys running on track *b*. An extension of framing *a* supports a pair of

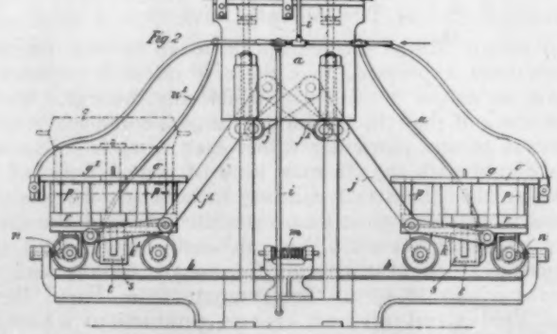


Fig 2

cylinders *h* *h'* supplied with motive fluid by pipes *i*. Their piston rods engage pins on the short ends of levers *j* and *j'*, the other ends of which levers are jointed to links *k* k^1 connected to the trolley *g* g^1. When the levers are rocked, the trolleys will move to and fro. Buffers *n* *n* prevent the trolleys from overrunning their set positions. The trolleys comprise plates *o* upon which the patterns rest, and through these plates pass pillars *p* upon the ends of which rest the flasks *g*. The pillars *p* are mounted upon frames *r*, supported on the rods of pistons *s* working in cylinders *t*. By means of flexible pressure pipes *u* *u'* the pistons are raised and the frames *r* and mold boxes *g* are lifted clear of the patterns, which are left behind on their plates.

TRADE NEWS

Trade News of Interest Desired from All our Readers. Address THE METAL INDUSTRY, 61 Beekman St., New York.

The plant of the Springfield Brass Company, Springfield, Mass., has been sold at auction on the foreclosure of the mortgage.

The executive offices of the Magnus Metal Company have been moved to the Trinity Building, No. 111 Broadway, New York City.

The Hall and Rankin Company, of Worcester, Mass., have just leased and started up the old Hammond Street Foundry of that city.

The Cahill and Remington Company, of South Framingham, Mass., have leased and started the foundry which has been vacant there for the past two years.

A new building will be erected by the Hendey Machine Company, Torrington, Conn., which will be 110 x 214 feet and cost about $50,000. It will be used as a machine shop.

The Metal Manufacturers' Supply Company, 626 Cherry street, Philadelphia, Pa., report that they are doing more business all the time and are getting orders from all over the Middle West.

The plant of Gray & Davis, makers of automobile and carriage lamps at Amesbury, Mass., is to be enlarged. The company will need additional equipment in lathes, buffing machinery and presses.

Maurice Wendell, manufacturing jeweler and silver refiner of New York and Chicago, Ill., has moved into his new six-story building at No. 105 William street, where his factory will occupy two floors.

The Waterbury Crucible Company report that they have no New England agent, but look after business from their home office at Waterbury, Conn. They will have several salesmen in New England.

In order that all the cleaning, sorting and grinding of their raw material may be done at Niagara Falls, N. Y., the plant of the Norton Emery Wheel Company situated in that city is to be enlarged. Also the kiln capacity of their Worcester plant.

Everything in the line of tools needed by the workers in brass, copper and aluminum is furnished by Patterson, Gottfried & Hunter, 146 Centre street, New York City. Also in the metal line prompt attention is given to all orders, large or small.

The Mohawk Smelting and Refining Works, who have built a plant at Utica, N. Y., have been incorporated recently with a capital stock of $100,000. The officers are: I. Ellis, president; J. M. Ross, vice-president and treasurer; S. Ellis, secretary.

The Clark-Horrocks Company, of Utica, N. Y., have bought the business of Gillette Brothers, of Auburn, N. Y., and will move the business to Utica. The Clark-Horrock people have factories in Utica and Rome, manufacturing brass fishing tackle.

The Manhattan Perforated Metal Company, 237 Centre street, New York, announce that they are prepared to perforate all kinds of sheet metals for all purposes. They report that they are specialists in perforating aluminum, brass, copper, tin and zinc.

A new brass foundry is to be built at Hartford, Conn., by J. M. Craig, who will make all kinds of castings in brass, bronze and aluminum. Mr. Craig is a founder of experience, having been connected with the Colts Fire Arms Company for many years.

The Ajax Metal Company, of Philadelphia, Pa., who manufacture high-grade alloys, announce that they will construct a new fireproof pattern loft at 52 Richmond street. The loft is to be built of steel and will be erected by Mitchell Bros. of Philadelphia.

The National Twist Drill & Tool Company, of Detroit, Mich., have increased their capital stock from $20,000 to $40,000 and intend to build special machinery for their own use to take care of their increasing business. The company was established about 18 months ago.

As we go to press there are again all sorts of reports on the plans of the merger of the National Lead Company and the United Lead Company. President Cole, of the National Lead Company, has termed some of the reports on the merger a mass of misinformation.

The Globe Manufacturing Company, of Painesville, Ohio, announce that they have all the equipment desired for their new factory, which includes three floors 26 x 115. They have been running for the past three years and manufacture brass goods and hardware specialties.

H. M. Shimer & Company, Philadelphia, Pa., are receiving some very good reports on their brand of Golden Rod Spelter, which they have recently put on the market. The spelter is proven by analysis to be a very high grade. The firm also make a high grade brazing solder.

A fire on the night of May 23d destroyed the foundry and warehouse of the Ohio Brass Company, Mansfield, Ohio, but the main buildings were unburned. The loss was fully covered by insurance and the foundry and warehouse will immediately be rebuilt. There will be no interruption in business.

About the middle of June C. W. Moore, of Bridgeport, Conn., a dealer in new and old metals, will move into a part of the building recently vacated by the Bridgeport Gas Light Company. Mr. Moore found his old quarters too small for his increasing business. In his new plant he will set up his Orbidon oil furnace.

The International Nickel Company, New York, have issued a small booklet which contains a list of the purposes for which nickel steels have been successfully applied in the United States, France, Germany and England. The booklet is an index of information for those interested in the manufacture and applications of nickel steel.

The Wright Manufacturing Company, of Philadelphia, Pa., have decided to build an addition of 20 x 55 feet to their brass shop and another of 22 x 23 feet to their brass foundry. Extensions will take in an adjoining city lot with a depth of 90 feet. The cost of the additions will be $8,000. The company manufacture art metal goods.

The Allyne Brass Foundry Company, of Detroit, Mich., have built a brick fire proof foundry building, which has been equipped with every modern appliance for the production of brass, bronze and aluminum castings. The company state that they are the largest of their kind in the country and that they make a specialty of automobile castings.

United States Senator William A. Clark, who is interested in the Henry-Bonnard Bronze Company, has made application to the officials of Mount Vernon, N. Y., for concessions, providing the company erects a large plant in that city. The present quarters of the Henry-Bonnard Bronze Company are at 430 West 16th street, New York City.

The Eagle Smelting and Refining Works, 738 East 14th Street, New York, have purchased the property adjoining their works, running through to 13th Street, a plot of 80 x 150 feet, and are erecting a new building, where they will install five furnaces, which will greatly increase their capacity. The company report that business is very good and is steadily increasing.

TRADE NEWS

Trade News of Interest Desired from All of our Readers. Address THE METAL INDUSTRY, 61 Beekman St., New York.

Application for a charter has been filed by the Atlanta Iron and Brass Bed Company, Atlanta, Ga. The incorporators are: James L. Coleman, W. R. Ware and N. T. Spratt. Capital stock $15,000. The company are fitting up a two story building 100 x 200 for the manufacture of a full line of iron and brass bedsteads, and will be in the market for all such raw material as iron and brass bed factories use.

The Kewanee Valve and Metal Works is the name of a new establishment at Kewanee, Ill., and which will manufacture valves, plumbers' and gas fitters' supplies. The officers of the new company are: President, Judge C. Wilson; vice president, S. L. Arter; treasurer, R. E. Taylor; secretary, Edwin J. Faull; foreman of the shop, Alfred Stenwall. The company own a patent on a valve which will shut by one turn.

Adolph Baeck has established the Aluminum Plating Company, of 182 West Houston Street, New York, to do all kinds of aluminum plating. Mr. Baeck reports that he is an expert plater and chemist, having devoted a life study to the art of plating, and can put any shade or color on all kinds of aluminum goods. By his process he expects to tint many of the aluminum novelties placed on the market.

The Union Smelting and Refining Company, 608 East 19th Street, New York, are improving their works by the erection of a new building adjoining their present plant. This addition will increase their capacity three fold. They will put in two additional smelters, making three in all. They will make a specialty of babbitt and white metals. The company smelt all kinds of dross and are dealers in new and old metals.

William H. Cramp & Sons Ship and Engine Building Company, of Philadelphia, Pa., report that they have received the order for all of the automobile castings of the Locomobile Company, of Bridgeport, Conn. The Cramp Company have received so many orders for castings that they have decided to enlarge their brass foundry, possibly doubling the size of it. They also have orders for gun metal castings from Bridgeport concerns.

The M. E. Moore Bronze and Plate Company, of Kingston, N. Y., were recently compelled to file a petition in bankruptcy in order to protect all of their creditors against a judgment for something which they say they never received. They expect to reorganize shortly and go on the same as ever. The firm has been in business for a number of years and is well known to the trade which it serves, which includes buyers of bronze and plated ware.

The Waterbury Farrel Foundry & Machine Company, of Waterbury, Conn., will put up two additional factory buildings chiefly for the storage of patterns and to cost about $20,000. The new elevated tracks of the New York, New Haven & Hartford Railroad will enter Waterbury on the old roadbed of the Highland Division and the Waterbury Farrel Foundry sold the railroad some of their land, including their old pattern storehouse, for the new right of way.

The Cutter, Wood & Stevens Company, of Boston, Mass., has secured the services of Frank J. Clark, of Springfield, Mass., as their representative in New England on electro-plating supplies. This makes four representatives this company has on the road in their different lines. The same company have through their representative, William T. Nicholson, Providence, R. I., equipped a brass foundry for Frank Ridlon Company, No. 200 Summer street, Boston, Mass.

"Spot Cash" is the slogan of John C. Culbert, a dealer in metals at 22 Beech Street, Pawtucket, R. I. Mr. Culbert is in the market for 300,000 pounds of yellow metal washings, coarse or fine, 300,000 pounds red metal washings, coarse or fine, 300,000 pounds of red metal grindings, 300,000 pounds of yellow metal grindings. He will be glad to communicate with any one who can furnish any part of the above material, and states that he will give all a square deal.

The Springfield Metallic Casket Company, of Springfield, Ohio, are enjoying an extensive business in metallic caskets, steel burglar proof grave vaults and zinc and copper interchangeable linings for woden caskets which are sealed hermetically. They also manufacture an extensive line of high grade casket hardware and ornaments, and are reaching out for trade wherever it can be found. They have an export trade with Australia, Cuba and South America.

The plant of D. R. Child Aluminum Novelty Company, of Providence, R. I., has been sold to the Buffalo Aluminum Company, which company consists of A. A. Fenyvessy, E. Wolff and W. Luttringhaus. The D. R. Childs plant is one of the oldest in the aluminum business, and was noted for its fine aluminum table ware. Mr. D. R. Child, who has managed the plant since it was established, has retired on account of ill health. The Providence plant has been moved to Buffalo and is in operation.

The Kavanagh-Ward Brass Company have been incorporated at Baltimore, Md., for the manufacture of all kinds of brass goods, especially distillery, brewery and sugar house work, also water and steam goods. John J. Ward, the treasurer, has been in the employ of the Henry McShane Manufacturing Company for the past 35 years and has been foreman and superintendent of that company for the past 20 years. Mr. Kavanagh, the president of the company, has conducted the largest coppersmithing business in Baltimore for the past ten years. The new company will manufacture only high-grade goods.

The Metal Manufacturing Company, of New Haven, Conn., announce that they are fully equipped for making anything in the line of stamped, pressed and drawn goods. Their superintendent, Mr. E. F. Kelley, has been engaged in the industry of drawing metals for years and since last January has been superintendent of the Metal Manufacturing Company's plant. Mr. Kelley has been successful in substituting a good deal of stamped work for castings and is an authority on drawn metals. He has written articles for THE METAL INDUSTRY on this subject. In addition to taking orders on all kinds of stamped, pressed and drawn goods, the Metal Manufacturing Company make a regular line of unholstery hardware.

A formal announcement has been made that the firm of Merchant & Evans Company have bought from Merchant & Co., 517 Arch street, Philadelphia, Pa., all its property and assets, and assumed all its debts and liabilities. Mr. Powell Evans, who was vice president for a number of years and who has been president for the past year of Merchant & Co., is the organizer and has controlling interest and is president of the new company. Merchant & Evans Company announce that they will continue with greater activity than heretofore the manufacture and distribution of metals, adhering rigidly to the high principles and conservative methods which have characterized the business founded and built up by the late Clarke Merchant. The old organization and personnel remain with the new company the same as heretofore.

At the outlay of about a half million dollars the Hoyt Metal Company have recently built a new factory at Granite City, Ill. The company have a 30-acre tract of land and the present capacity of their plant is 550 tons of finished alloys per day. This tonnage will be increased when their new rolling mill for rolling chemical lead and hard antimonial alloy lead is completed, which will be about July first. The company have separate plants for the manufacture of babbitt metal, shot, targets, wax and traps and refining shops for taking care of their residues. The Perth Amboy, N. J., plant is a repetition of their Granite City plant on a smaller scale. The company report that they are doing a business of three times the volume they did three years ago. The headquarters of the company are at St. Louis, Mo.

TRADE NEWS

Trade News of Interest Desired from All our Readers. Address THE METAL INDUSTRY, 61 Beekman St., New York.

An entirely new plant is to be built by The Homan Silver Plate Company, of Cincinnati, Ohio. They have purchased a plot of land on Morgan street.

B. Haertlein & Company, recently organized, have started a brass foundry in Milwaukee, Wis. They have put up a neatly arranged brick foundry building, and report a nice line of regular orders.

The Taunton Crucible Company, of Taunton, Mass., announce that with their additional kilns, large storage and milling rooms, they carry a stock of seasoned crucibles that will satisfy all foundrymen.

Pawling & Harnischfeiger, of Milwaukee, builders of electric cranes, find it more profitable to buy their brass castings than to operate their own brass foundry, and will therefore discontinue their brass foundry.

The S. Obermayer Bulletin for May, which is published by the S. Obermayer Company, Cincinnati, Ohio, contains the usual number of interesting items for foundrymen. The Bulletin is sent free to any foundrymen in the world.

The Ross-Tacony Crucible Company, Tacony, Philadelphia, Pa., are putting up a new brick office building two and a half stories high, which will contain two rooms 16 x 16. It will also have a fire proof vault and other modern conveniences. When the office is finished the space occupied by it will be utilized as a packing room.

The J. W. Paxson Company, of Philadelphia, Pa., issue a special circular on their sand blast machinery, which gives complete description of the apparatus and of the various uses to which the sand blast can be put. As announced in THE METAL INDUSTRY, the Paxson Company this year celebrate their 50th anniversary of the establishment of their firm. The company manufacture and sell all kinds of foundry supplies.

The Eaton, Cole & Burnham Company, Bridgeport, Conn., announce that their capital has not been increased from $500,000 to $800,000. Their present capital is $500,000, and they have the privilege of increasing it to $800,000, but have not as yet availed themselves of this privilege. Regarding the published statements about the transfer of stock of the company, the announcement is made that some new capital has been provided for the company by new stockholders of the West, but the integrity of the Eaton, Cole & Burnham Company is unchanged and will be continued indefinitely.

The Phenix Tube Company, of Brooklyn, N. Y., which was originally and has been for several years a New Jersey corporation, has recently been re-incorporated under the New York State laws, and the capital stock increased from $50,000 to $100,000. This re-incorporation and increase in capital stock was to provide for enlargement and development of the business by increased plant and buildings. It is the intention of the management to double the present capacity within the next few months. This is rendered necessary by the rapidly increasing demand for their product.

The Dings Electro-Magnetic Separator Company had a very interesting exhibit of metal and ore separators at the Milwaukee Merchants' and Manufacturers' Exposition, which closed May 21st. The company reports an order for an $8,000 separating plant from a large zinc mine at Mineral Point, Wis. They have just made shipment on an order for a special magnetic separating apparatus to be used in connection with a gold dredge operating in Yukon Territory. They also report sales of their standard magnetic separators to ten different brass and metal melting concerns during the month of April.

J. J. Ryan & Company, of Chicago, Ill., who operate the largest jobbing brass foundry in the United States, announce that they are now running in good shape in every department in their new quarters, at 105-109 Jefferson Street. Their foundry equipment consists of 32 furnaces, 40 moulders, 30,000 square feet floor space, 10 tons capacity. In their tool equipment are universal milling machines, planers, air compressor for testing high service fittings, engine lathes, monitor lathes, double head lathes, cock grinders, fox lathes, special lathes, etc. With better facilities than ever, the company solicit from their old friends a continuance of their patronage.

PERSONAL

Mr James A. Doughty has been elected treasurer of the Chicago Brass Company, of Kenosha, Wis., taking the position held by the late Frederick L. Titus. The officers of the company at present are: President and treasurer, Jas. A. Doughty; vice-president, A. P. Hine; secretary, A. C. Dallas.

Lehigh University, of South Bethlehem, Pa., has this year two candidates for the degree of metallurgical engineer, Ralph G. Kirk and F. C. Ryan, of Harrisburg, Pa. The subject of the thesis of Clarence B. White, a candidate for an analytical chemist is "A New Method for the Determination of Phosphorus in Phosphor Bronze."

The Sky Scraper Bed Room of Col. Robert M. Thompson, president of the New York Metal Exchange, was the subject of an illustrated article recently in one of the Sunday papers. Mr. Thompson has a complete bed room suite on the 25th floor of the Wall Street Exchange Building some 300 feet in the air. If he is detained at his office to a late hour he can retire to his sky scraper chamber and enjoy a quiet night's rest with all the comforts of home without the long journey to his residence.

MEETINGS

About 65 members were present at a meeting of the National Brass Manufacturers' Association, held in May at the Gibson House, Cincinnati, Ohio. Routine business was transacted. The next meeting will take place in January, location as yet not decided.

As we go to press the prospects are good for an interesting meeting of the American Foundrymen's Association, who will hold their eighth annual convention in New York City, from the 6th to the 9th of June. Convention headquarters are located in the Murray Hill Hotel, 41st Street and Park Avenue, within one block of the Grand Central station. As New York City offers such opportunities for sight seeing, the evenings of the convention will not be devoted to business, thus enabling the visitors to enjoy the amusements of the metropolis. One full day of the convention will be spent at Columbia University, where a number of interesting papers will be read.

At the annual meeting of the International Nickel Company, held May 23d, the following directors were elected for the ensuing year: Robert M. Thompson, Bayonne, N. J.; Ambrose Monell, Tuxedo, N. Y.; E. F. Wood, J. R. De Lamar, New York; William Nelson Cromwell, New York; Charles Cassils, Montreal; Duncan Coulson, Toronto; Millard Hunsiker, London, England; Joseph Wharton, Philadelphia; S. H. P. Pell, New York; Edmund C. Converse, Greenwich, Conn. The third annual report submitted to the stockholders showed net profits of $668,093. Treasurer James L. Ashley said that the increased demand for nickel during the year has enabled the company to reduce its stock and pay off over $1,000,000 in borrowed money.

TRADE NEWS

Trade News of Interest Desired from All of our Readers. Address THE METAL INDUSTRY, 61 Beekman St., New York.

At the annual meeting of the Worcester Metal Dealers' Association, held recently, the following officers were chosen: President, F. E. Reed, F. E. Reed Company; 1st vice-president, Geo. F. Brooks, Harrington & Richardson Arms Company; 2nd vice-president, Enoch Earle, P. Blaisdell & Company; treasurer, Aldus C. Higgins, Norton Emery Wheel Company; secretary, Chas. F. Marble, Curtis & Marble Machine Company; councilors, J. Philip Bird, Hobbs Manufacturing Company; E. M. Woodward, Woodward & Powell Planer Company; A. W. Whitcomb, Whitcomb Manufacturing Company; Douglas Gordon, Marcus Mason & Company. The subject of joining with the National Metal Trades was not voted upon, but is to be considered by the firms individually.

At the annual meeting of the Cincinnati Metal Trades Association, Cincinnati, O., held on May 18, a resolution was unanimously passed expressing the belief that a merger of the Local with the National Trades Association would be a wise and proper thing and would result in great benefit to all members. The resolution also provides that when members of the association employing 75 per cent. of the operatives shall sign an agreement providing for such a merger, that it shall become effective, when ratified at a regular meeting. At the meeting an agreement was adopted by the terms of which apprentices will start at 8 cents per hour and will receive an increase of one cent per hour every six months and at the expiration of four years will receive a bonus of $100. This is a uniform contract adopted by all members of the Cincinnati Association. It is stated to be one of the most liberal in the country.

METAL MARKET REVIEW

COPPER.—The foreign copper market has shown very little change. Spot G. M. B's. opened at £65 2s. 6d., and after advancing to £65 15s., prices declined to £64 on the 23d, when prices gradually advanced again to £65 3s. 9d. at the close.

The New York copper market has been rather steady and prices are ⅛ to ¼ higher than a month ago. The few outside lots that were pressing on the market have been sold, consumers have placed large orders and confidence in the general outlook of the copper market has been more apparent. The exports as reported the last of May are 22,753 tons for the month. At the moment the demand from abroad is not very active. China has been in the market again, and this demand combined with the more active home buying has resulted in a steady market all round. At the close the market is steady at 15 to 15¼ for Lake, 15 to 15⅛ for electrolytic, 14¾ to 15 for casting brands.

TIN.—The London tin price closes £1 15s. lower than a month ago. On the third of May spot tin in London sold at £138 10s., and futures £134 10s. The heavy premium on spot has gradually disappeared, and at the close spot is quoted at £136 5s., with futures at £135 5s.

In the New York market prices have held very steady, owing to the strong statistical position. The arrivals amount to 2,913 tons for the month, while consumption is estimated at 3,000 tons. The market closes at 30.10 for carload lots, and 30¼ cents for smaller lots.

LEAD.—There has been no change in the Trust price for lead, $4.50 for New York delivery carload lots, while smaller lots on spot have brought 4⅝ to 4¾. The demand has been good. The foreign lead market has advanced 6s. 3d. during the month, closing at £12, 17s. 6d.

SPELTER.—Foreign spelter has held very steady, and prices at the close are 5s. lower than a month ago.

In the New York market spelter has continued to decline, and prices at the close are fully half a cent a pound lower for the month, closing at 5¼ to 5⅜ for carload lots and 5½ to ¾ for smaller lots from store.

OLD METALS.—The old metal market has held fairly steady for good heavy copper and brass; the weakest feature on the list has been zinc dross, and from $90 to $92 a ton, prices have dropped to $86 at the close.

TRADE WANTS

ANSWERS SENT IN OUR CARE WILL BE FORWARDED.

PLATER with 8 years' experience desires to take charge of a shop. Has a thorough knowledge of all the finishes in electro, matt, antique, and immersion. Address WM. MCDERMOTT, 173 Ten Eyck Street, Brooklyn, N. Y.

ALUMINUM PLATING. We have mastered the art of plating aluminum with silver, gold, copper, gun metal and any other finish desired. We are prepared to make contracts for plating any metal on aluminum. Address the ALUMINUM PLATING COMPANY, 182 West Houston Street, New York City.

FOREMAN OF A BRASS FOUNDRY WANTED. A young man capable of taking charge and who will develop into a first class foundry foreman. Address stating salary expected and references to YOUNG FOUNDRY FOREMAN, care of THE METAL INDUSTRY.

CORE MAKER FOREMAN WANTED for air compressor work. Must be able to handle 20 or 30 men. Address FOREMAN CORE MAKER, care of THE METAL INDUSTRY.

POSITION WANTED, as foreman by an experienced and first class chandelier maker and pattern maker. Is well acquainted with modern antique work and finish. Address, CHANDELIER MAKER FOREMAN, care of THE METAL INDUSTRY.

A PARTY WITH $2,000 can learn of a good opportunity to enter the plating business in a shop which has been established six years in a good western city. Experience is more essential than money. Address, OPPORTUNITY, care of THE METAL INDUSTRY.

FOR SALE. Several valuable patents for grinding, scouring and plating all kinds of metal. For further particulars address, THE METAL INDUSTRY.

POSITION desired by a chemist used to dross analyses, non-ferrous metals and alloys, also iron, steel and materials used in their manufacture. Address, C. B. C., care of THE METAL INDUSTRY.

WANTED:—Assistant bookkeeper, who thoroughly understands brass and copper rolling mill office work. Address, CANADA BRASS ROLLING MILLS, LTD., Toronto, Can.

THE ROBERTS CHEMICAL COMPANY, of Niagara Falls, N. Y., desire a SALESMAN to sell their "High Grade Caustic Potash." Address them with full particulars and salary expected.

WANTED, SCHWARTZ MELTING FURNACE.—We are in the market for second hand Schwartz melting furnace, and parties who are offering them for sale please address: SCHWARTZ, care of THE METAL INDUSTRY.

FOR SALE. THREE NEW CHARLIER FURNACES, perfect in every way and fully guaranteed. Price $300 a piece. Address, CHARLIER, care of THE METAL INDUSTRY.

WANTED—In any quantity or quality or in any form old bismuth, nickel, platinum, mercury, gas mantel waste, gas mantle salts and bronze powder, nickel anode waste, etc. JOSEPH RADNAI, 331 East 80th Street, New York City.

POSITION WANTED as FOREMAN by an art founder. Understands thoroughly green and French sand molding and the cire perdue process. Has new ideas about molding which will save labor in a foundry. Is modern and up-to-date. Address MOLDER, care THE METAL INDUSTRY.

INFORMATION BUREAU.

Subscribers intending to purchase metals, machinery and supplies and desiring the names of the various manufacturers and sellers of these products can obtain the desired information by writing to THE METAL INDUSTRY. Our Information Bureau is for the purpose of answering questions of all kinds. Send for circular.

Metal Prices, June 5, 1905

METALS

	Price per lb.
TIN—Duty Free.	
Straits of Malacca	30.15
COPPER, PIG, BAR AND INGOT AND OLD COPPER—Duty Free. Manufactured 2½c. per lb.	
Lake	15.25
Electrolytic	15.15
Casting	14.75
SPELTER—Duty 1½c. per lb.	
Western	5.40
LEAD—Duty Pigs, Bars and Old 2⅛c. per lb.; pipe and sheets 2½c. per lb.	
Pig Lead	4.50
ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods 13c. per lb.	
Small lots	37.00
100 lb. lots	35.00
1,000 lb. lots	34.00
Ton lots	33.00
ANTIMONY—Duty ¾c. per lb.	
Cooksons	9.75
Hallets	9.50
Other	9.25
NICKEL—Duty 6c. per lb.	
Large lots	45 to 50
Small lots	50 to 75
BISMUTH—Duty Free	$1.50 to $2.00
PHOSPHORUS—Duty 18c. per lb.	
Large lots	45
Small lots	65 to 75
	Price per oz.
SILVER—Duty Free—Commercial Bars	$0.58
PLATINUM—Duty Free	20.50
GOLD—Duty Free	20.67
QUICKSILVER—Duty 7c. per lb. Price per Flask.	40.00

Zinc—Duty, Sheet, 2c. per lb. 600-lb. casks, 7.00 per lb., open, 7.34 per lb.

Tobin Bronze—Rods, Unfinished, 19c.

Tobin Bronze—Rods, Finished, 20c.

PRICE FOR ALUMINUM BRONZE INGOTS.

	Per pound.
2½ per cent	19c.
5 per cent	19½c.
7½ per cent	20½c.
10 per cent	21½c.

Manganese Bronze, Ingots	16 to 17c.
Phosphor Bronze, Ingots	16 to 20c.
Silicon-Copper, Ingots	32 to 36c.

OLD METALS

Heavy Cut Copper	12.50c.	13.00c.
Copper Wire	12.50c.	12.75c.
Light Copper	11.00c.	11.25c.
Heavy Mach. Comp	11.00c.	11.50c.
Heavy Brass	8.00c.	8.25c.
Light Brass	6.75c.	7.00c.
No. 1 Yellow Brass Turnings	7.50c.	8.25c.
No. 1 Comp. Turnings	9.00c.	9.50c.
Heavy Lead	4.00c.	4.25c.
Zinc Scrap	4.00c.	4.25c.
Scrap Aluminum, sheet, pure	22.00c.	25.00c.
Scrap Aluminum, cast, alloyed	12.00c.	18.00c.
Old Nickel	15.00c.	25.00c.
No. 1 Pewter	20.00c.	21.00c.

PRICES OF SHEET COPPER

SIZES OF SHEETS.		96oz. & over 75 lb. sheet 30x60 and heavier	64oz. to 96oz. 50 to 75 lb. sheet 30x60	32oz. to 64oz. 25 to 50 lb. sheet 30x60	24oz. to 32oz. 18¾ to 25 lb. sheet 30x60	16oz. to 24oz. 12½ to 18¾ lb. sheet 30x60	14oz. and 15oz. 11 to 12½ lb sheet 30x60
		CENTS PER POUND.					
Not wider than 30 ins.	Not longer than 72 ins.	19	19	19	19	19	20
	Longer than 72 ins. Not longer than 96 ins.	19	19	19	19	19	20
	Longer than 96 ins.	19	19	19	19	19	21
Wider than 30 ins. but not wider than 36 ins.	Not longer than 72 ins.	19	19	19	19	19	21
	Longer than 72 ins. Not longer than 96 ins.	19	19	19	19	19	21
	Longer than 96 ins. Not longer than 120 ins.	19	19	19	19	20	22
	Longer than 120 ins	19	19	19	20	21	
Wider than 36 ins. but not wider than 48 ins.	Not longer than 72 ins.	19	19	19	20	21	23
	Longer than 72 ins. Not longer than 96 ins.	19	19	19	20	22	24
	Longer than 96 ins. Not longer than 120 ins.	19	19	19	21	23	27
	Longer than 120 ins.	19	19	20	22	25	
Wider than 48 ins. but not wider than 60 ins.	Not longer than 72 ins.	19	19	19	20	22	25
	Longer than 72 ins. Not longer than 96 ins.	19	19	19	21	23	28
	Longer than 96 ins. Not longer than 120 ins.	19	19	20	22	25	
	Longer than 120 ins	20	20	21	23	27	
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 ins.	19	19	20	22	27	
	Longer than 96 ins. Not longer than 120 ins.	19	19	21	24	29	
	Longer than 120 ins.	20	20	22	27		
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 ins.	20	20	22	25		
	Longer than 96 ins. Not longer than 120 ins.	21	21	23	26		
	Longer than 120 ins.	22	22	24	28		
Wider than 108 ins.	Not longer than 132 ins.	23	23	25			
	Longer than 132 ins.	24	24	27			

Rolled Round Copper, ⅜ inch diameter or over, 19 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)

Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.

All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, wider than 17 inches, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planished Copper, one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side, 2½c. per square foot.

For tinning both sides, double the above price.

For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

Metal Prices, June 5, 1905

Net Cash Prices.

COPPER BOTTOMS, PITS AND FLATS.

14 oz. to square foot, and heavier, per lb..... 23c.
Lighter than 10 oz..... 29c.
10 oz. and up to 12 oz..... 26c.
12 oz. and up to 14 oz. to square foot, per lb..... 24c.
Circles less than 8 in. diam., 2c. per lb. additional.
Circles over 13 in. diam. are not classed as Copper Bottoms.
Polished Copper Bottoms and Flats, 1c. per lb. extra.

PRICE LIST FOR ROLL AND SHEET BRASS

Prices are for 100 lbs. or more of sheet metal in one order. Brown & Sharpe's Gauge the Standard.

Common High Brass	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Wider than and including	2 12	12 14	14 16	16 18	18 20	20 22	22 24	24 26	26 28	28 30
To No. 20 inclusive..	.22	.23	.25	.27	.29	.31	.33	.36	.39	.42
Nos. 21, 22, 23 and 24	.22	.24	.26	.28	.30	.32	.34	.37	.40	.43
Nos. 25 and 26.....	.23	.24½	.27	.29	.31	.33	.35	.38	.41	.44
Nos. 27 and 28.....	.23	.25	.28	.30	.32	.34	.36	.39	.42	.45

Add ½ cent per lb. additional for each number thinner than Nos. 28 to 38, inclusive.

Add 7 cents per lb. for sheets cut to particular lengths, not sawed, of proportionate width.

Add for polishing on one side, 40 cents per square foot; on both sides, double this price.

Brazing, Spinning and Spring Brass, 1 cent more than Common High Brass.

Extra Quality Brazing, Spinning and Spring Brass, 2 cents more than Common High Brass.

Low Brass, 4 cents per lb. more than Common High Brass.

Gilding, Rich Gold Medal and Bronze, 7 cents per lb. more than Common High Brass.

Discount from List, 30 per cent.

PRICE LIST FOR BRASS AND COPPER WIRE

BROWN & SHARPE'S GAUGE THE STANDARD.	Com. High Brass	Low Brass	Gilding Bronze and Copper
All Nos. to No. 10, Inc	$0.23	$0.27	$0.28
Above No. 10 to No. 16.....	.23½	.27½	.28½
Nos. 17 and 18.....	.24	.28	.32
" 19 and 20.....	.25	.29	.33
No. 21.....	.26	.30	.34
" 22.....	.27	.31	.35
" 23.....	.28	.32	.36
" 24.....	.30	.34	.38

Discount, Brass Wire, 30 per cent.; Copper Wire, 30 per cent.

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ in. to 3½ in. O. D. Nos. 4 to 13 Stubs Gauge, 20c. per lb.
Seamless Copper Tubing, 23c. per lb.
For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe size.....	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.....	28	27	22	21	20	20	20	20	20	20	20	21	22	24	26	27

BRAZED BRASS TUBING

Brown & Sharpe's Gauge the Standard.

											Per lb
Plain	Round	Tube,	¾	in.	up	to	2	in.,	to No.	19,	inc.	$0 35
"	"	"	⅞	"	"		1¾	"	"	19,	"	36
"	"	"	1	"	"		1⅞	"	"	19,	"	38
"	"	"	1⅛	"	"		1⅞	"	"	19,	"	41
"	"	"	1¼	"	"		1⅞	"	"	19,	"	48
"	"	"	1⅜	"	"		2	"	"	19,	"	65
"	"	"	1½	"	"		2¼	"	"	19,	"	1 06
"	"	"	1⅝	"	"		2½	"	"	19,	"	1 50
Smaller than ¾ inch.....												Special
¾ inch to 3 inch, to No. 19, inclusive.....												35
3 inch.....												40
Over 3 inch to 3⅛ inch.....												45
Over 3⅛ inch.....												50

Bronze and copper advance 3 cents. Discount 33 per cent.

PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

Wider than and including	3 in. 12 in. in coils.	6 in. 14 in.	14 in. 16 in.	16 in. 18 in.	18 in. 20 in.	20 in. 24 in.	24 in. 30 in.	30 in. 36 in.	36 in. 40 in	Cutting to Length.	Polishing or Satin Finishing One side.
No. 13	42	42	44	44	44	44	47	47	47	1	2
" 14	42	42	44	44	44	44	47	47	47	1	2
" 15	42	42	44	44	44	44	47	47	47	1	2
" 16	42	42	44	44	44	44	47	47	47	1	2
" 17	42	42	44	44	44	44	47	47	47	1	3
" 18	42	42	44	44	44	44	47	47	50	1	3
" 19	42	42	44	44	44	44	47	48	51	1	4
" 20	42	44	44	44	44	46	49	50	52	1	4
" 21	42	46	46	46	46	48	51	52	58	2	5
" 22	42	46	46	46	48	48	51	55	59	2	5
" 23	42	46	46	46	48	48	51	57	60	2	6
" 24	42	46	48	50	50	50	53	59	62	2	6
" 25	44	47	49	51	51	51	54	61	65	2	7
" 26	44	47	50	54	54	54	59	63	69	2	8
" 27	44	48	52	56	56	57	62	66	72	2	10
" 28	44	48	54	56	56	57	61	70	75	2	11
" 29	46	49	56	58	60	60	69	75	80	2	13
" 30	46	50	58	60	64	70	77	80	85	2	15
" 31	48	52	60	63	68	76	79	82	88	3	17
" 32	50	54	62	66	74	82	89	95	100	3	19
" 33	52	56	65	70	78	89	96	105	115	3	21
" 34	55	60	67	75	83	95	108	115	125	3	25
" 35	.....	70	75	85	95	105	120	130	.....	.....	Polished or Scratch Brushed 2 sides double above prices.
" 36	.....	85	95	105	120	125	140	.....	.....	.....	
" 37	.....	100	110	125	140	155	170	.....	.....	.....	
" 38	.....	120	135	150	165	180	200	.....	.....	.....	
" 39	.....	140	160	180	200	220	.....	.....	.....	.....	
" 40	.....	170	200	220	240	.....	.....	.....	.....	.....	

In flat rolled sheets the above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheeet. All columns except the first refer to flat rolled sheet. Prices are for 50 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

Discounts as Follows are Given for Sheet Orders Over 200 Pounds.

200 to 1,000 pounds.....10 per cent. off list.
1,000 to 2,000 " 10 per cent. and 2 " "
2,000 to 4,000 " 10 " " 3 " "
4,000 pounds and over 10 " " 5 " "

PRICE LIST OF SEAMLESS ALUMINUM TUBING—STUBS' GAUGE.

STUBS' G.	1-4"	3-8"	1-2"	5-8"	3-4"	1"	1 1-2"	2"	2 1-2"	2 3-4"
4 to 11	.....	.....	96	86	83	77	67	61	61	61
12	.....	1 08	96	86	83	77	67	61	61	61
13	.....	1 08	96	86	83	77	67	64	64	64
14	.....	1 08	96	86	83	77	67	64	64	64
15	.....	1 12	96	89	86	80	70	67	67	67
16	.....	1 15	99	93	89	83	70	70	70	70
17	.....	1 18	1 02	96	93	86	73	73	73	73
18	1 85	1 24	1 05	99	92	86	77	77	77	80
19	1 88	1 28	1 08	1 02	99	93	83	80	80	83
20	1 95	1 31	1 15	1 08	1 05	99	89	86	86	89
21	2 01	1 37	1 21	1 15	1 12	1 05	99	93	93	96
22	2 17	1 44	1 24	1 18	1 15	1 08	1 05	99	1 05	1 05
23	2 35	1 50	1 31	1 24	1 21	1 15	1 15	1 08	1 15	1 15
24	2 48	1 60	1 37	1 31	1 28	1 18	1 21	1 21	1 24	.....
25	2 65	1 69	1 47	1 37	1 34	1 28	1 34	.....	.....	.....

Prices are for lots of 10 to 20 lbs. Boxing extra. Smaller, larger and intermediate sizes furnished by manufacturers.

Discounts as Follows are Given for Tube Orders Over 50 Pounds.

50 to 200 lbs.....5 per cent. discount off list
200 to 2,000 lbs.....10 " " " " "
2,000 to 4,000 lbs.....10 and 3 " " " " "
4,000 lbs. and over.....10 and 5 " " " " "

PRICE LIST FOR ALUMINUM ROD AND WIRE—B. & S. GAUGE.

Diameter B.& S.G'ge.	0000 to No.10	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price per lb	$ 38	38½	38½	0 39	39½	0 40	40½	0 41	0 42	0 43	0 44	0 47	0 52

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Srape's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50 per cent.